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ABSTRACT

A study investigated the participation of black Americans in vocational education. Four national data sets were analyzed: "The High School and Beyond Surveys," "The 1987 High School Transcript Study," "The Schools and Staffing Survey of 1987," and "National Survey of Postsecondary Faculty." The analyses revealed the following: (1) at the secondary level, most black students were participating in vocational programs to the same extent as white students; (2) black high school students who took vocational courses tended to pursue postsecondary education regardless of the amount of vocational education they took; (3) at the postsecondary level, black students were just as likely as white students to attend public two-year institutions, but were less likely to take vocational courses or to be completing vocational or other associate degrees; and (4) black students who left college without a degree or certificate took similar numbers of vocational courses as did white noncompleters. Recommendations were made to collect information to determine the following: (1) the best strategies for increasing the participation of blacks in high school technical and communication programs and the participation of blacks from low socioeconomic status backgrounds in high school vocational education; and (2) why black postsecondary students were less likely than white students to take courses in agriculture, home economics, trade and industry, and computer programming. (Contains 43 references.) (CML)

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BLACK AMERICANS AND VOCATIONAL EDUCATION: PARTICIPATION IN THE 1980s

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TABLE OF CONTENTS

Acknowledgments i

Introduction 1

Background 1

Purpose and Organization of the Report 3

Historical Background 4

Overview 4

Current Status of Black Americans in Vocational Education 21

Participation in Secondary Vocational Education 23

Participation in Postsecondary Vocational Education 52

Summary and Conclusion 73

Background 73

Current Status 74

Conclusion 78

References 79

Appendices 85

Appendix A—Technical Notes 85

Appendix B—Detailed Tables 101

INTRODUCTION

Background

Fundamental changes in the U.S. economy are creating a schism in American society. As new high technology industries and occupations emerge, heavy manufacturing industries fade, and information, service, and retail occupations grow, the future workers of America are increasingly falling into one of two groups. In one group, the majority of young women and men who attend college after high school graduation and complete a baccalaureate degree obtain the skills and knowledge to meet the demands of an increasingly technological society. Most of these college graduates can look forward to somewhat stable jobs with middle to high incomes, adequate benefits, and opportunities for advancement. However, in the other group, often termed "the forgotten half," most young people who do not attend or complete college do not acquire these skills and cannot find jobs in the old industries or training opportunities in the new occupations. They face a future of unstable employment in jobs with low incomes, limited benefits, and few opportunities for advancement (William T. Grant Foundation, 1988).

This dichotomy is especially acute among Black Americans.[1] While increasing numbers of Black Americans have completed college and work in professional middle to high income occupations, Blacks are still less likely than whites to complete four years of college. Black American high school graduates enter college at about two-thirds the rate of white graduates. Moreover, of those Black students who do enter, only about twelve percent complete four years of college compared to about twenty-four percent of young whites (Jaynes & Williams, 1989). The consequences of lower participation in and lower completion of postsecondary education are not only higher unemployment for young Black American adults but employment in lower paying, less challenging occupations.

These consequences of lower postsecondary participation and completion are not likely to change. In past decades there were two types of jobs available to students who

[1]This is a period of transition in the correct terminology for referring to Americans of African descent. "African-Americans" is becoming the most accepted term in the African-American community. In using the terms, "Black" and "Black Americans" NCRVE does not mean to be insensitive to that trend. However, because the National Association for the Advancement of Black Americans in Vocational Education (NAABAVE) uses the term "Black Americans" and the data used coded all Black Americans together whether or not they were of African descent, this term was thought to be most accurate for this report. However, most of the discussion is about African-Americans. "Black" and "Black Americans" are capitalized due to the political and cultural nature of these terms. On the other hand, "white" is not capitalized because it does not reflect a cultural community.

did not attend college: ones that provided well-paid, steady work such as jobs in manufacturing, the trades, communications, utilities, and transportation, and others that offered few of these advantages. However, the relative numbers of desirable jobs for those who do not attend college are now declining, and replacing them are more low-skilled service and retail jobs that do not provide the same levels of income, security, or advancement (Rumberger, 1986; Silvestri & Lukasiewicz, 1987).[2]

Despite this decline in high paying jobs for relatively less educated workers, there are still many opportunities for people without a baccalaureate degree but with some postsecondary education, provided this postsecondary education represents a well articulated program of studies that is occupationally oriented. The more traditional of these opportunities include employment in such occupations as chefs, hotel sales and management, machinists, auto mechanics, various skilled construction trades, medical and dental technicians, and a wide range of business and clerical positions. In addition, some of the emerging high technology occupations such as electronic technicians, medical equipment technicians, computer operators, computer-aided design technicians, medical records technicians, data processors, data processing equipment repairers, and radiological technicians do not always require four years of college (Silvestri & Lukasiewicz, 1987). Even assembly and machine operator jobs are being upgraded to involve the use of computer-operated equipment.

Performing successfully in these jobs requires rigorous vocational/technical education and a firm grasp of basic academic skills in reading, writing, mathematics, and science. More often than not, some postsecondary vocational/technical education is desirable, although outstanding secondary programs have successfully placed high school graduates in these better paying, technically oriented occupations. However, it is not known whether Black American students are participating in these programs. Many Black American and other educators are concerned that Black American students may not be enrolling in vocational education in general and in high technology programs in particular and, thus, may be missing out on these opportunities.

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[2]Ogbu (1988) argues that the economic groups within the Black community are not so dichotomous but fall along a continuum from the underclass, to the poor, to the working class, to the professional middle class. Still, this does not contradict the fact that many of the traditional working class jobs are disappearing.

Purpose and Organization of the Report

The purpose of this report is to analyze the status of Black Americans in secondary and postsecondary vocational education during the 1980s. The report provides a description of the participation patterns of Black Americans in vocational education during that time. In addition, in order to understand their current status, the historical relationship between Black Americans and vocational education is reviewed. The report is intended for policymakers and educators who are interested in the participation of Black Americans in vocational education.

The report is divided into four sections. The first section provides the background and purpose of the report. The second section contains the historical review of the status of Black Americans in vocational education. The third section presents a quantitative analysis of the status of Black Americans in vocational education in the 1980s. The final section contains the summary and conclusion.

The quantitative analysis in the third section uses the most recent national data sets to determine the latest status and outcomes of Black Americans in secondary and postsecondary vocational education as students and teachers. Of primary interest is the participation of Black American students in various vocational programs in terms of the percentages who took courses and the number of credits averaged in each program. Rates of completion and other outcomes are also presented. These participation and completion measures are compared to those of white students and, in some cases, to other minority groups. In addition, differences between Black American and white students within socioeconomic levels and gender are examined. Finally, the representation of Black Americans among vocational faculty is compared to the representation of Black Americans among vocational students.

HISTORICAL BACKGROUND

Overview

This section provides the historical background of the status of Black Americans in vocational education. First, the historical relationship between Black Americans and vocational education is examined. Second, studies that measure the more recent status of Black Americans in vocational education are presented. Next, research about the recent attitudes of Black Americans toward vocational education is explored. Finally, studies that offer structural explanations for the status and attitudes are discussed.

Historical Relationship Between Black Americans and Vocational Education

Vocational education started in the 1880s as the "manual training" movement which espoused the educational purpose of integrating manual skills into the academic secondary curriculum in order to make intellectual concepts more understandable and relevant for the many students who were dropping out of school and to create more balanced instruction for the academically successful students (Cremin, 1961). However, business leaders in the rapidly industrializing nation soon demanded that this training be relevant to industry, and by the early 1900s, educators agreed to provide "industrial education" to train students for actual jobs. In 1917, the Smith-Hughes Act appropriated the first federal funds for separate "vocational education" classes in public schools (Cremin, 1961; Lazerson & Grubb, 1974, pp. 14-17).

While the manual training movement had stressed the benefit to education of the integration of manual and intellectual training, a major purpose of industrial and vocational education was to meet the labor needs of industry. However, it also offered an educational response to two social and economic challenges: the huge influx of rural poor and European working-class immigrants to the northern cities and the presence of four million newly free, uneducated, and unemployed Black Americans in the South (Du Bois, 1903, p. 20; Lazerson & Grubb, 1974, pp. 10-14). Educators and industrialists were concerned about the immigrants' high attrition rate in secondary schools that left them uneducated, unskilled, and unprepared for life as industrial workers. For the urban immigrants and other poor, educators prescribed socialization and training in the values of hard work and proper homemaking which in schools translated into woodworking or industrial arts for

boys and sewing, cooking, or home economics for girls (Lazerson & Grubb, 1974, pp. 9-10).

Also at this time, vocational agricultural education was introduced in an attempt to provide organized and scientific agricultural information to farmers and to halt the flow of rural workers into the cities by making education more relevant for country children (Cremin, 1961, pp. 41-50). The 1862 Morrill Act established and funded a land-grant college in each state which offered instruction in agriculture, "mechanic" arts, and home economics. The Second Morrill Act in 1890 expanded those offerings to encompass academic instruction applied to "the industries of life" (Cremin, 1961, p. 43). The land-grant colleges were one result of a strong agrarian educational reform movement that sought to include vocational agricultural education in rural schools. By the time the Smith-Hughes Act of 1917 provided federal aid for vocational education in secondary schools, agriculture was an accepted part of the vocational education curriculum (pp. 50-57).

In the South, industrial training for Black Americans quickly evolved into a way to provide Blacks with white-determined moral values and occupational skills that retained Blacks in a subservient social and economic class (Lazerson & Grubb, 1974, pp. 10-14). During the Reconstruction, public education with the traditional academic content was extended to Blacks in separate schools. However, most white southerners wanted to preserve academic education for whites and provide only industrial training for Blacks, so they soon whittled down the resources for Black academic education, leaving mainly industrial training in the schools (pp. 105-112). This training emphasized the moral values and skills that served to maintain the established roles of Blacks in the South as farm and plantation laborers and farm machinery operators for boys and domestic workers for girls (Ogbu, 1978, pp. 112-116). Thus, in the South, the vocational education areas of agriculture and home economics were originally synonymous with Black education (Lazerson & Grubb, 1974, p. 11).

In 1890, the Second Morrill Act provided federal land-grant funding for eleven existing Black colleges and established five new Black land-grant colleges (Taylor, Powers, & Johnson, 1990). Although the major purpose of the act was to increase funds for the 1862 land-grant colleges, the legislation also required that either land-grant colleges be open to both Black and white students or that separate but equal colleges be maintained for Black and white students. In the South, this mandate translated into the funding of

separate but unequal Black land-grant colleges (Bell, Powers, & Rogers, 1987). These sixteen southern Black 1890 land-grant colleges functioned primarily to train Black mechanical and agriculture teachers for Black public schools and were never as adequately supported in research and extension cooperative programs as the 1862 land-grant colleges (Anderson, 1982, pp. 190-195; Bell et al., 1987). This emphasis on teacher training in these subjects further reinforced the association of Black education with agricultural and industrial education (Anderson, 1982, pp. 194-195).

In the North, despite the presence of more egalitarian principles than in the South, Black Americans were still limited educationally, economically, socially, and legally to separate and inferior positions relative to white society. Free Blacks could not vote until passage of the Fifteenth Amendment; they were restricted to the lowest level of domestic and service jobs; and they were socially segregated from whites (Ogbu, 1978, pp. 122-125). Until the early 1800s, there was much opposition to any education of free Blacks. Most schooling was offered by private or religious groups, and even that was disputed (p. 124). Black Americans slowly began to be included in public schools, starting with the public school systems of large northern cities in the early 1800s. However, this inclusion consisted of the establishment of separate schools in most states, and the doctrine of separate but equal facilities was reinforced by *Plessy v. Ferguson* in 1896. Consequently, until school segregation was overturned in 1954 by *Brown v. Board of Education*, northern Blacks never had the opportunity to receive an education that would prepare them for integration into white society or the labor market (Ogbu, 1978, pp. 124-125; Ploski & Williams, 1989).

Instead, education for Black Americans in the North, as in the South, reflected the position of Blacks in the labor market. During the 1800s and early 1900s, the racism of northern employers, unions, and society barred Blacks from entering skilled and semi-skilled trades. From 1830 to the early 1900s, northern Black leaders, such as Frederick Douglass, and white abolitionists, such as William Lloyd Garrison, tried to establish a manual labor college or trade school to train Blacks for these jobs. However, they ran into so much opposition from local whites that they had to abandon the idea (Anderson, 1982, pp. 181-184). Although the northern factories of the industrial revolution in the late 1800s demanded an unprecedented number of new workers, the skilled and semi-skilled jobs were given to native and immigrant whites, and Blacks were found only in the most unskilled jobs (Anderson, 1982, pp. 196-197).

Although most white southerners and many northerners felt that industrial education was the most appropriate type of education for Black Americans, the role of industrial education was not a settled issue within the Black community (Heintze, 1985). The two leading Black spokesmen of the late nineteenth century, Booker T. Washington and W. E. B. Du Bois, represented opposite sides of a debate about the purposes of industrial education and academic education for Black Americans.

Booker T. Washington believed that industrial education was the best avenue for progress for Black Americans. Washington was a former slave who had worked his way through Hampton Institute, an industrial training school started by a white northerner, General S. C. Armstrong (Washington, 1901). Armstrong had started Hampton in order to provide the type of education he felt most suited to Black "mental processes," and the school had become the model of Black education for many white northern philanthropists (Ogbu, 1978). Washington agreed with Armstrong's philosophy that Black Americans needed to learn a trade and the self-discipline of hard work. He promoted this belief as a teacher at Hampton and then as the founder of Tuskegee Institute, which he modeled after Hampton (Washington, 1901). Washington supported an academic curriculum for Blacks, but he felt that it should be combined with the learning of a skill or trade by which to support oneself. Since at that time the professions and the skilled trades were largely closed to Black Americans, they had little choice but to train or use their training in agriculture, factories, lower skilled trades, or domestic service. Rather than challenging these existing economic and political limits, Washington proposed working within them. As he stated in an address at Fisk University in 1895,

> I have been told that the young colored man is cramped and that after he gets his education there are few chances to use it. I have little patience with such arguments. The idea has been too prevalent that the educated colored man must either teach, preach, be a clerk, or follow some profession. The educated colored men must, more and more, go to the farms, into the trades, start brick yards, sawmills, factories, open coal mines; in short, apply their education to conquering the forces of nature. (excerpted in Lazerson & Grubb, 1974)

Washington (1901) felt similarly about education for women, except he proposed that they train in occupations traditionally performed by Black women:

> I often thought how much wiser it would have been to give these girls the same amount of mental training—and I favour any kind of training, whether in the languages or mathematics, that gives strength and culture to the

> mind—but at the same time to give them the most thorough training in the latest and best methods of laundrying and other kindred occupations. (p. 91)

These attitudes earned Washington support from whites in the South and the North, especially since he also advocated the continuation of social segregation in the South and the avoidance of "agitation of questions of social equality" (Washington, 1901, p. 223). As he said in his famous Atlanta Exposition Address in 1896,

> In all things that are purely social we can be as separate as the fingers, yet one as the hand in all things essential to mutual progress. (pp. 221-222).

Washington felt that progress in the social and political realms would come eventually through long-term struggle and urged Blacks in the South to "cast down your bucket where you are" and learn "the common occupations of life" (pp. 220-223). Evoking the faithfulness of Black slaves toward their owners, he urged white southerners to turn to southern Blacks rather than to immigrants for the needed labor for the South's industrial development, promising whites that "you and your families will be surrounded by the most patient, faithful, law-abiding, and unresentful people that the world has seen" (p. 221).

While many southern Blacks were inspired by Washington's message, others were dismayed, for he "practically accepts the alleged inferiority of the Negro races," and the message was one of "adjustment and submission" (Du Bois, 1903, p. 36). Dr. W. E. B. Du Bois represented the views of Black American intellectuals and also spoke for the many other Black Americans who disagreed with Washington. Educated at Fisk University, Harvard University, and in Europe, in 1895 Du Bois became the first person of African descent to earn a Ph.D. from Harvard. He spoke out strongly against what he saw as Washington's limited vision for "the race" in the United States.

In his 1903 book of essays, *The Souls of Black Folk*, Du Bois eloquently described racism in the United States and its consequences for Blacks. He objected to Washington's accommodations to racism and his promotion of common and industrial education as the primary solution to Black social and economic problems. Du Bois reminded readers that during the years that Washington had advocated turning away from "political power, insistence on civil rights, and the higher education of Negro youth," the

following trends developed: Negroes were disenfranchised, the status of civil inferiority for Negroes was reinforced legally, and aid was withdrawn from "institutions for the higher training of the Negro" (p. 37). He also pointed out that common and industrial training schools for Blacks could not exist without "teachers trained in Negro colleges or trained by their graduates." Furthermore, he argued that

> the closer knitting of the Negro to the great industrial possibilities of the South is a great truth. And this, the common schools and the manual training and trade schools are working to accomplish. But these alone are not enough. The foundations of knowledge in this race, as in others, must be sunk deep in the college and university if we would build a solid, permanent structure. (p. 75)

Du Bois (1903) thus insisted that a successful education system for Black Americans started with common schools and could include industrial education but depended upon the existence of Black colleges and universities to train "the best of the Negro youth as teachers, professional men, and leaders." He also maintained that all education for Blacks should be based on ability rather than race and that Black Americans should insist on civic equality and the right to vote (pp. 38-39).

Although Black Americans were split in this debate on the purpose of Black education, most whites supported Washington, and his model prevailed (Heintze, 1985). From 1900 to 1930, although high school education for Blacks was expanded somewhat and more predominantly Black colleges were established, the majority of southern Blacks continued to receive industrial training in agriculture, domestic and personal service, shop work, and labor (Ogbu, 1978, pp. 115-116).

In the North, due to labor market exclusions and the larger societal racism they represented, between the mid-1800s and the early twentieth century most Black education also remained limited to industrial training for domestic or agricultural work or to just enough training to teach these subjects. Further attempts to establish high quality mechanical and trade schools for Blacks failed during this period because federal, state, or private donors refused to fund them (Anderson, 1982, p. 195). The great migration of southern Blacks to northern cities between 1900 and 1930 increased the number of Blacks in the North who needed education and jobs. However, continuing labor market racism and residential segregation by race, enforced by local ordinances and real estate practices, confined the growing population of northern Blacks to inferior schools and limited

economic opportunities (Ogbu, 1978, pp. 129-130). Black youth began to see academic and professional education, rather than industrial education, as the only way to avoid being trapped in low-level domestic and service occupations (Anderson, 1982, p. 195).

In 1933, the educational goals of both Washington and Du Bois were challenged by Carter Woodsen in *The Mis-Education of the Negro.* He pointed out that industrial education prepared Black Americans for either obsolete jobs or good jobs made inaccessible by racism, and that academic education forced Black Americans to accept white culture and values while not providing any entrance into the white professions. He advocated education based on Black American culture and values that would return self-respect and pride to Black Americans (Cremin, 1988, p. 122). However, this position was not reflected in the curriculum until the late 1960s.

Since their establishment, most Black industrial education institutions were coeducational, although the curriculum was differentiated by gender. Black girls' education, beyond the basics, centered upon their perceived future roles as wives and mothers, so they nearly always received some home economics education. They were also held responsible for the moral state of the Black family. In a classic case of blaming the victim, white society and educators saw Black women as sexually promiscuous, due to their past and continuing sexual exploitation by white men. Consequently, their curriculum was filled with training in morality. Since an important source of employment was domestic service in white families' homes, "appropriate" training (housekeeping, morality) was perceived to be important. Some of the stronger Black education institutions diversified their curricula, but the variety of women's programs was still less than what was offered to men, and programs were still segregated by sex. For instance, in 1916, Hampton offered girls training as homemakers, cooking and sewing teachers, domestic workers, and the "women's part" of agriculture—dairying, poultry, and care of house and school gardens. In contrast, men at Hampton learned carpentry, bricklaying, blacksmithing, wheelwrighting, machinery, painting, tailoring, printing, engineering, leatherwork, and tinsmithing (Ihle, 1986).

During the first decades of the twentieth century, the educational opportunities of Black women slowly expanded. Local Black industrial training schools became public high schools, and larger industrial training institutes turned into colleges. Some of the new schools offered more academic work, and some expanded their vocational offerings as

traditional trades became obsolete. For their daughters, Black families were interested in education that would ensure that the young women could avoid domestic work, where they were vulnerable to the attentions of white men. Of the new vocational areas, Black women most often chose the fields of nursing, cosmetology, and printing. Nursing and cosmetology were popular and open to Black women because these services were needed in the Black community, and the work fit into the accepted women's roles. Printing was opening up to women because print shops on campuses were expanding and men were choosing other fields of vocational work (Ihle, 1986).

After 1930, as industrial development demanded more skilled workers, a reversal occurred in vocational education as whites claimed access to the better jobs. White schools began emphasizing industrial training while Black schools offered more academic education (Ogbu, 1978, p. 117). In addition, the Depression caused increased competition between Black and white schools for limited educational funds, so these public school systems, already separate, became even more unequal (p. 118). By 1935, Blacks in the South were underrepresented in vocational education programs that received federal funds, and Black institutions were less likely to receive funds. While southern white students were equally likely to be enrolled in agriculture (36%), home economics (34%), and trade and industries (30%), Black students were most likely to be found in agriculture (55%) and home economics (29%); only sixteen percent were in trade and industry programs. The lower participation by Black students in the trades most likely reflected the exclusion of Black Americans from practicing in these occupations (Anderson, 1982, pp. 190-193). In addition, although distributive (sales) occupations had been funded in vocational education by the George-Dean Act of 1929, these programs were not offered in most Black schools (Ogbu, 1978, p. 117).

During the 1930s, Black educators attempted to reduce educational and economic inequities in the North and the South through a Black vocational guidance movement that sought to improve the vocational counseling for Black students. They saw that Black students were either aspiring to very low-level occupations or expecting to pursue an academic or professional education. These educators believed that more information on the wide range of middle-level skilled occupations would lead Black students to choose more of these occupations (Anderson, 1982, pp. 197-214). However, this movement had very little effect on the underparticipation of Black students in the more lucrative job paths, due to the severity of the Depression and the continuing exclusion of Blacks from these

occupations. Instead, during the 1940s, the demand for civilian labor during World War II created more opportunities for Black men and women than any vocational guidance or training had been able to do. Black educational strategy finally moved away from vocational education and instead encouraged Black youth to aim for entrance into colleges and universities (Anderson, 1982, pp. 214-215). Thus, Du Bois' vision that Black youth should strive for the highest level of education was finally fulfilled.

The National Association for the Advancement of Colored People (NAACP) was formed in 1909 to improve the legal, educational, economic, and social status of Black Americans and to obtain "political and civil equality" (Cremin, 1988, p. 197; Franklin, 1966, p. 439). Between the 1930s and 1950s, this group fought and won many battles in the South against inequalities in school expenditures between white and Black schools, especially in teachers' salaries. In addition, their legal challenges to the separate but (un)equal tradition of public school systems and postsecondary institutions opened up more opportunities for Black students, teachers, and educators, and the number of Black administrators in education increased (Cremin, 1988, pp. 197-198; Ogbu, 1978, pp. 118-119). During the 1960s and 1970s, civil rights legislation gave Black Americans in the North and the South more equality and legal redress for discrimination in voting, education, and employment. These laws, aimed at improving the status of Blacks in the economy and society, highlighted the need for an educational system that could prepare Blacks for that participation. The major responses to this concern about Black education were school integration and compensatory education (Ogbu, 1978, pp. 130-131). However, it is not known whether these changes produced equality in educational offerings and curriculum between Blacks and whites, especially in vocational education. In addition, although Title IX (1972) was passed to guarantee equality of opportunity by gender in educational programs, by 1979, women in vocational programs were still enrolled mainly in traditional women's fields—home economics, cosmetology, and clerical work (Ihle, 1986). Thus, while legal equality may have been present, actual equality for Blacks and for women in vocational education may not have been achieved.

Recent Status of Black Americans in Vocational Education

Few studies in the last decade have provided an overview of the recent status of Black Americans in vocational education. While three research projects have attempted to paint a broad picture of Black Americans and their relationship to vocational education in

the United States, most studies pertain to particular states or types of communities. This section reviews the few available studies.

A common perception exists that vocational education has been and still is a dumping ground for Black Americans and other minority and low-income groups. The few recent studies support this perception (Oakes, 1985, 1990). As part of the research team for John Goodlad's "A Study of Schooling," Oakes (1985) investigated tracking in junior and senior high school classrooms in twenty-five schools across the nation. In addition, she used National Science Foundation (NSF) national survey data to identify race and class differences in some of the precursors to tracking—the opportunities for elementary and secondary students to learn mathematics and science (Oakes, 1990).

Oakes (1990) found that in elementary and secondary school, students who were Black American, Hispanic, low income, inner city residents, or in "low-ability" classes had fewer opportunities than other students to participate in traditional academic mathematics and science programs for the following reasons. First, Black American, Hispanic, and low-income students were more likely than white and middle-income students to be assessed as low in academic ability and placed in lower-level tracks. Second, students in majority Black or disadvantaged schools were exposed to less demanding programs. Third, students in low tracks and in less advantaged schools were exposed to fewer math and science resources such as highly qualified teachers, equipment, and development of higher-level skills. Consequently, these lower opportunities perpetuated race and social class differences in math and science achievement.

In the study of tracking in secondary schools, Oakes (1985) found that nonwhite vocational students and vocational students in nonwhite or racially mixed schools were more likely than white vocational students and those in white schools to be training for lower-level occupations and jobs. There was no evidence that disproportionate percentages of nonwhite students were enrolled in vocational education classes overall. However, more vocational course offerings at nonwhite and mixed schools were related to lower-level jobs, and within mixed schools, greater percentages of whites than nonwhites were enrolled in more higher level vocational programs.

In a study of enrollments in college transfer, technical, and vocational programs among Black and white students in the North Carolina Community College System, West

and Shearon (1982) asked whether Black students were more likely than whites to be enrolled in programs that led to lower status occupations. They showed that for both men and women, whites were twice as likely as Blacks to be enrolled in college transfer programs, while Blacks were more likely than whites to be enrolled in vocational programs. In addition, by assigning socioeconomic status (SES) scores for the particular U.S. Census occupation each curriculum program prepared the students to enter, they confirmed that programs in the college transfer area were of higher status than those in the technical area which, in turn, were of higher status than those in the vocational area. However, among all students and among students in the technical and vocational areas, white students were preparing for only slightly higher status occupations than Black students, and within the college transfer area, the programs of Black and white students had equal status.

West (1989) used the U.S. Department of Education's national High School and Beyond survey to examine the postsecondary vocational education attainments of 1980 high school seniors by 1984. He found that Black students in this cohort were less likely than whites to complete a vocational associate's degree or certificate. In addition, of those who completed vocational associate's degrees, Blacks were less likely than whites to receive a degree in technical and engineering fields. Although there were no differences by race in certificates in this field, he did find that students from high SES backgrounds were more likely than lower SES students to complete certificates in technical and engineering fields.

Earlier studies also revealed limited opportunities for Black students. The 1979 Office for Civil Rights (OCR) Survey reported by Sheppard (1983) found that in secondary vocational programs in 1978-1979, Black students were underrepresented in programs with what he saw as higher income and job opportunities (agriculture, medical emergency technician, steno/secretarial, electronics, welding, auto specialization, and machine shop) and overrepresented in programs leading to jobs with lower income and fewer advancement possibilities (medical lab assistant, clerk/typist, appliance repairer, masonry, custodial service, quantity foods, textile production, and upholstering).

The underrepresentation of Black students in agriculture has also been documented by agricultural educators, who noticed a decrease among Black secondary students in vocational agriculture programs during the 1960s and 1970s (Bowen, 1987). They linked

this trend to a decline of the number of Black farmers in the United States during the 1950s and 1960s (Straquadine, 1987).

The few studies of vocational teachers and administrators have been done by the National Association for the Advancement of Black Americans in Vocational Education (NAABAVE) and other Black vocational educators. NAABAVE surveyed fifty states about the percentages of Blacks in vocational education and found either low levels of information about Black employment and/or low Black employment in vocational education in most states (Young, 1989). In three states that provided information, Blacks made up lower percentages of vocational administrators and teachers than the percentage of Blacks in the state populations. Another study found similar underrepresentation in Oklahoma (Miller & Royal, 1989). In addition, a NAABAVE analysis of Black employment in the U.S. Office of Vocational Educational and Adult Education showed high percentages of Black Americans in the lowest Government Service (G.S.) grades and lower percentages of Blacks in the higher G.S. grades (Young, 1989).

Black agricultural educators concerned about increasing the number of Black students in vocational agriculture note that most vocational agriculture teachers are white (Bowen, 1987). The historically and predominantly Black 1890 land-grant agricultural and mechanical colleges provide excellent training for many Black agricultural researchers and teachers (Taylor et al., 1990). However, the percentage of Black faculty at historically white 1862 land-grant colleges, which train the majority of vocational agriculture teachers, has remained very low (Bowen, 1987). In addition, while the percentage of Black students majoring in agriculture at the bachelor's level has not changed, the percentage of Black students obtaining master's degrees in agriculture has decreased. Consequently, the percentage of agricultural faculty who are Black is not likely to increase (Larke & Barr, 1987).

For the most part, these studies confirm that while Black American secondary students were no more or less likely to be in vocational education programs than white students, they were more likely than white students to be found in less challenging academic classes and in vocational programs that led to lower-level job opportunities. In addition, Black American postsecondary students were more likely than whites to be in vocational programs but less likely to complete vocational degrees. Furthermore, Black American students were underrepresented in both secondary and postsecondary vocational

programs that led to higher-level jobs, including the traditional program area of agriculture. Finally, Black Americans were underrepresented as vocational education administrators and teachers.

Recent Attitudes of Black Americans Toward Vocational Education

No national studies were found that examined the attitudes of Black Americans toward vocational education. Most of the research has been carried out in specific states and communities on particular groups of students. For example, in one study of eighth graders that was conducted in both an urban city and a suburban community in New Jersey, it was found that students did not differ in their attitudes toward vocational education according to their race, gender, or high school curriculum (academic, general, or vocational), but did differ according to their educational status (Vos, Tesolowski, & Hux, 1982). Vos et al. report that while all students averaged positive attitudes toward vocational education, those who were educationally disadvantaged (two years behind grade level on a standardized test and enrolled in a compensatory education program) averaged less favorable attitudes toward vocational education than nondisadvantaged students. However, Black, Hispanic, and white students and male and female students held similar positive attitudes.

A 1987-1988 study of the images of vocational education held by Ohio eleventh graders who were not in vocational programs found that more of these students (31%) held positive attitudes toward vocational education than held negative attitudes (13%) (Rosetti, 1989b). However, fifty-five percent had neither positive nor negative images of vocational education. More negative images of vocational education were held by males than females, by students in the academic curriculum than those in the general curriculum, by white than Black students or students of other races, and by students from the highest SES than those from the lowest. Therefore, the students with the most negative attitudes toward vocational education were white, male, high SES, and/or in college preparatory programs. Rosetti (1989a) also investigated why these academic and general curriculum students did not enroll in vocational education. Over half of these students felt either that it did not meet their interests or that it was not relevant because they were going to college.

It is possible that more positive attitudes on the part of Black Americans are recent changes. A 1980 study by NAABAVE found that many Black parents had negative attitudes toward vocational education, and they did not want their children to participate in

these programs or the occupations to which they led (Young, 1989). King (1977) studied the attitudes of Black vocational and nonvocational Michigan high school students and their parents toward vocational and technical education programs and he found a mixed set of opinions. On the one hand, the majority of both vocational and nonvocational Black students believed that most people in their community had a positive opinion about vocational education. In addition, the majority of both groups thought that "vocational education should be encouraged more among Black high school students," although more vocational than nonvocational students agreed with this statement. On the other hand, the majority of both groups reported that their parents wanted them to go to college. In addition, over half of nonvocational students and under half of vocational students felt that vocational education in the trades was used to keep Blacks in inferior occupational positions. Since the majority of nonvocational students and half of the vocational students felt that white-collar jobs were better than blue-collar jobs, it is possible that at least half of Black students felt negatively toward vocational programs that led to blue-collar jobs. However, while vocational students were more apt to feel positively toward vocational education than nonvocational students, both groups contained students with negative and positive attitudes.

These few recent studies on student attitudes toward vocational education suggest that Black students as a group did not necessarily view vocational education negatively. Most students held somewhat positive attitudes toward vocational education. Among eighth-grade students, educationally disadvantaged students held more negative attitudes toward vocational education than did more advantaged students of all races. However, among all eleventh-grade students, the students with the most negative attitudes were those who were white, male, and from higher SES backgrounds. In addition, in one study, vocational Black students tended to see vocational education more positively than did nonvocational Black students.

Some research from the 1970s suggests that Black parents may have negative attitudes towards vocational education and may prefer that their children prepare to attend college. However, other studies indicate that most students in the Black community held positive attitudes toward vocational education. Regardless of these attitudes, since about one-half of the Black students in King's (1977) study felt that vocational education in the trades was used to keep Blacks in inferior positions, and one-half or more felt that white-collar jobs were better than blue-collar jobs, a substantial proportion of the Black

community may have been and may still be avoiding vocational education, especially in programs that do not lead to white-collar jobs.

Continuing Structural Biases

The historical account of Black Americans in vocational education helps to explain the more recent lower participation of Black Americans in vocational education as well as any lingering overrepresentation in low-level programs. Clearly, vocational education functioned as Du Bois feared it would—as a channeling of Black Americans away from academic and higher education. In that case, it is understandable that Black students would want to avoid vocational education when they have the choice. However, if contemporary vocational education can improve the position of Black Americans in the labor market, or if some specific programs do help, then Blacks may be underrepresented in the higher-level programs due to racism and structural biases that have continued from earlier times. These structural biases are examined in this section.

Although blatant discrimination in schools is no longer legal, there are many subtle mechanisms in schools that can lead to inferior education for Black children and result in lower opportunities both in school and in the labor market. Ogbu (1978) identified the following four influences within the classrooms he observed in California: teachers' attitudes and expectations; testing, misclassification, and ability grouping; textbooks and curriculums; and counseling. First, teachers' attitudes and expectations exerted powerful influences on the evaluation and achievement of students. Ogbu found that white teachers and Black parents often rejected each other's explanation of a student's problem, and student performance deteriorated. In addition, teachers gave the same low grades to students over time, despite improvement, which also served to discourage performance. Secondly, testing, misclassification, and ability grouping all hindered the achievement of Black children. Culturally biased tests were used to rank children in ability groups. Students in the lower ability groups then received a lower quality of instruction in those groups, which prevented them from ever catching up to the higher-level groups, who received higher quality instruction. Finally, the labeling involved in ability grouping reinforced the students' low opinions of their ability to succeed in school and their negative attitudes toward education. Thus, students were prepared psychologically for less desirable roles in society.

Thirdly, Ogbu (1978) found that the textbooks and curriculums, through omissions, slurs, and stereotypes, "consciously and unconsciously . . . teach Black and white children their respective places in American society" (p. 141). Finally, he saw Black academic problems treated as social adjustment problems and counselors performing little academic counseling. Educators emphasized "socialization goals" over "educational goals" for minority children as preparation for entering school, and Black children were encouraged to develop qualities that kept them dependent on whites rather than teaching them skills to compete with and challenge whites for desirable positions (p. 145). In addition, Ogbu points out that the low economic return that Black Americans receive for their education and the low occupational status of most Blacks discourages Black students from achieving in school.

In Massachusetts, Mokros (1984) studied some of the mechanisms that directly affect minority placement in vocational programs. She found that the admissions criteria, which consist of tests, grades, conduct, attendance, recommendations, and interests, cluster students into vocational programs along racial, cultural, handicap status, and gender lines. She found most of these criteria to be biased against minority and poor students. Recommendations, especially, can reflect teacher stereotypes about how students perform and to what they should aspire. In addition, student occupational interests are so influenced by their peers that student choices of vocational programs cannot help but reinforce race, cultural, and gender stereotypes.

Oakes (1985) argues against tracking, citing the cumulative effect of being assigned to low-ability classes which fall disproportionately on nonwhite students and students in predominantly minority and mixed schools. She shows how vocational education functions as a low-ability track, and that once students are assigned to the vocational track in secondary school, it is difficult to change to a higher level track in either secondary or postsecondary school. Students receive the message that they do not belong in the normal academic tracks and are, thus, discouraged from aspiring higher. As a result, she questions whether vocational education should be offered at the secondary level (pp. 167-171).

Summary

The studies reviewed offer numerous historical and structural reasons why Black Americans in the 1980s might be found in lower-level vocational programs and have

negative attitudes toward vocational education as a result. A history of being limited to lower-level vocational education programs and occupations may explain any lingering overrepresentation in low-level vocational education programs. However, it is also possible that Blacks may be underrepresented in the higher-level programs due to continuing racism and structural biases.

Recent studies show that while Black American students were no more likely to be in vocational education programs than white students, they were more likely than white students to be found in less challenging academic classes and in vocational programs that led to lower-level job opportunities. Black American students seemed to be underrepresented in both secondary and postsecondary vocational programs that led to higher-level jobs. In addition, Black Americans were underrepresented as vocational education administrators and teachers.

In studies on the attitudes of students towards vocational education, Black students as a group did not necessarily hold negative attitudes toward vocational education, and vocational students tended to hold more positive attitudes about vocational education than nonvocational students. However, Black parents may have had more negative attitudes toward vocational education, and a substantial proportion of the Black community may have been and may still be avoiding vocational education, especially in programs that do not lead to white-collar jobs.

The next section presents data from the 1980s on the participation of Black Americans in vocational education. This analysis examines whether Black Americans in the 1980s enrolled in vocational education in general and in high technology programs in particular at similar or different rates than white students. Vocational programs to which Black students have been traditionally limited such as agriculture, home economics, and mechanics and repair fields are also examined.

CURRENT STATUS OF BLACK AMERICANS IN VOCATIONAL EDUCATION

As discussed, Black Americans historically have had mixed feelings about vocational education. Some have viewed vocational education as a barrier to postsecondary education and the greater economic and social opportunities afforded by a college degree. Others have seen vocational education as a deliberate strategy by white society to dump Black youth into inferior educational programs that keep them out of the economic mainstream. Still others have realized that high quality vocational education can lead to rewarding careers but have found it difficult to gain access to the better programs.

Given this history, what patterns of participation by Black Americans in vocational education actually exist? In this section, we examine findings from analyses of several national data sets providing information on the vocational course-taking patterns of secondary and postsecondary students. This data also provides information on labor market outcomes. Specifically, we seek to answer the following questions:

- To what extent do Black Americans participate in vocational education? Does their participation differ from that of white students or other minority groups?
- Does participation in vocational education by Black Americans vary by SES or by gender?
- How many Black Americans complete secondary and postsecondary vocational education programs?
- How have Black Americans participating in vocational education fared in the labor market or in the pursuit of postsecondary education?

Additionally, we examine some of the national data on the demographics of secondary and postsecondary faculty to determine how many Black Americans teach in vocational education programs.

The analyses rely on four major sources of data:

1. *The High School and Beyond Surveys*, which provide data on a national sample of students who were high school seniors in 1980 and 1982; the data set includes information on both secondary and postsecondary course taking.

2. *The 1987 High School Transcript Study,* which provides data on high school course taking for a national sample of students who were high school seniors in 1987.

3. *The Schools and Staffing Survey of 1987,* which reports information on a national sample of secondary faculty.

4. *The National Survey of Postsecondary Faculty,* which consists of a national sample of postsecondary faculty from nonproprietary postsecondary institutions that grant degrees at the associate level or higher.

Appendix A describes each of these data sets in greater detail.

To assess the participation of students in vocational education, it is first necessary to define what courses constitute vocational education in the secondary and postsecondary curricula. Doing so is not always straightforward. Typing I, for example, serves a large number of students who intend to take further courses in business, as well as students who simply want to learn keyboarding for their own personal use. Similarly, some courses are much more occupationally specific than others. Business English, for example, concentrates more on imparting academic English skills, while accounting tends to be more occupation-specific.

For purposes of the analyses performed here, we used taxonomies of courses developed for the U.S. Department of Education by MPR Associates. At the secondary level, vocational courses fall into one of three categories: consumer and homemaking education, general labor market preparation, and specific labor market preparation (Gifford, Hoachlander, & Tuma, 1989). Specific labor market preparation courses are divided into the program areas of agriculture, business, health, occupational home economics, trade and industry, and technical and communications. Postsecondary vocational courses are grouped into the seven program areas of agriculture, business and office, marketing and distribution, health, home economics, technical education, and trade and industry (Choy & Horn, in press). Appendix A explains these taxonomies in more detail.

Participation in Secondary Vocational Education

Overall Participation

In 1982, virtually every high school senior had participated in vocational education by taking at least one vocational course by the time of high school graduation. Moreover, eighty-seven percent of all high school seniors had completed one or more courses in specific labor market preparation (see Table 1). With the exception of Native Americans, all students participated in vocational education at about the same rate, regardless of race ethnicity.[3] Among 1982 Native American high school seniors, ninety-four percent had taken a course in specific labor market preparation. This same pattern prevailed in 1987.

Table 1
Percentage of 1982 and 1987 public high school seniors completing at least one vocational course and at least one specific labor market preparation course, by race ethnicity

	1982	1987
Percent completing at least one vocational course		
Total	99	98
Race ethnicity		
Native American	99	98
Asian	96	94
Hispanic	99	98
Black, nonHispanic	99	99
White, nonHispanic	97	98
Percent completing at least one specific labor market preparation course		
Total	87	89
Race ethnicity		
Native American	94	92
Asian	78	83
Hispanic	90	89
Black, nonHispanic	87	88
White, nonHispanic	86	88

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data; Hoachlander (forthcoming), p. 8; and unpublished tabulations from the 1987 High School Transcript Study. See Appendix Table B-1.

[3] Any differences reported are statistically significant at the level of $p \leq .05$. Any other apparent differences are not statistically significant. See Appendix A for a detailed discussion of the statistical procedures used for comparisons.

Overall, students from lower SES backgrounds were more likely to have participated in vocational education than students from higher SES backgrounds (see Table 2). However, this pattern was true primarily for white students. While ninety-three percent of white students from lower SES backgrounds took one or more specific labor market preparation courses, only seventy-eight percent of white students from higher SES backgrounds took these courses.

Table 2
Percentage of 1982 public high school seniors completing at least one specific labor market preparation course, by socioeconomic status and gender and by race ethnicity

	Socioeconomic Status				Gender	
	Lowest quartile	Second quartile	Third quartile	Highest quartile	Female	Male
Total	91	90	86	78	84	89
Race ethnicity						
Native American	94	—	94	—	96	92
Asian	88	73	81	75	73	82
Hispanic	91	93	88	79	88	91
Black, nonHispanic	87	89	83	88	86	88
White, nonHispanic	93	90	86	78	83	90

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data. See Appendix Table B–1.

Since Black students were much more likely than white students to come from lower SES backgrounds, it might be expected that Black students in general, and those from lower SES backgrounds in particular, would be more likely to participate in vocational education (see Table 3). However, unlike white students, Black students took vocational courses regardless of their SES background (see Table 2). Of Black students from lower SES backgrounds, eighty-seven percent took specific labor market preparation courses, while eighty-eight percent of Black students from higher SES backgrounds took these courses.

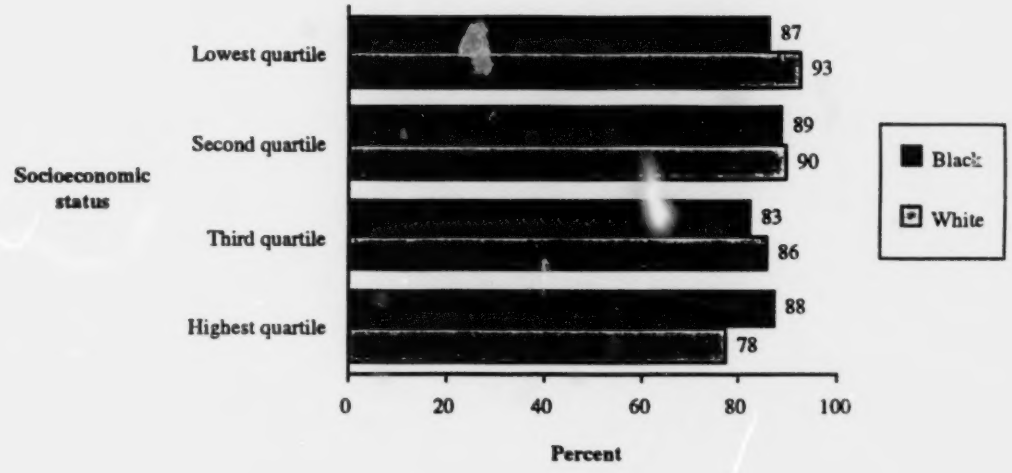
Table 3
Percentage distribution of 1982 public high school seniors, by socioeconomic status and by race ethnicity

	Socioeconomic Status			
	Lowest quartile	Second quartile	Third quartile	Highest quartile
Total	26	26	25	24
Race ethnicity				
Native American	35	22	30	13
Asian	14	31	26	29
Hispanic	43	25	21	11
Black, nonHispanic	52	25	16	7
White, nonHispanic	19	26	27	28

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

While Black students from all SES backgrounds participated equally in vocational education, Black students from lower SES backgrounds were less likely to take vocational courses than white students from the same backgrounds (see Figure 1). This difference is a concern because Black students from lower SES backgrounds may be especially in need of specific labor market preparation. While more Black students came from lower SES backgrounds than white students, fewer Black students than white students from these backgrounds participated in vocational education. Thus, instead of Black students taking more vocational courses than white students overall, it appeared that Black and white students were equally likely to take vocational courses. Similarly, among women as well as among men, Black and white students also took vocational courses at equal rates overall before SES background was taken into account (see Table 3).

Figure 1
Percentage of Black and white 1982 public high school seniors completing at least one specific labor market preparation course, by socioeconomic status



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data. See Appendix Table B-1.

Specific labor market preparation (SLMP) courses were divided by level into first courses, second courses, and specialty courses. Most students (79%) took at least one first course. However, fewer took second courses (43%) or specialty courses (22%) (see Table 4). There were no differences by race within first, second, or specialty courses.

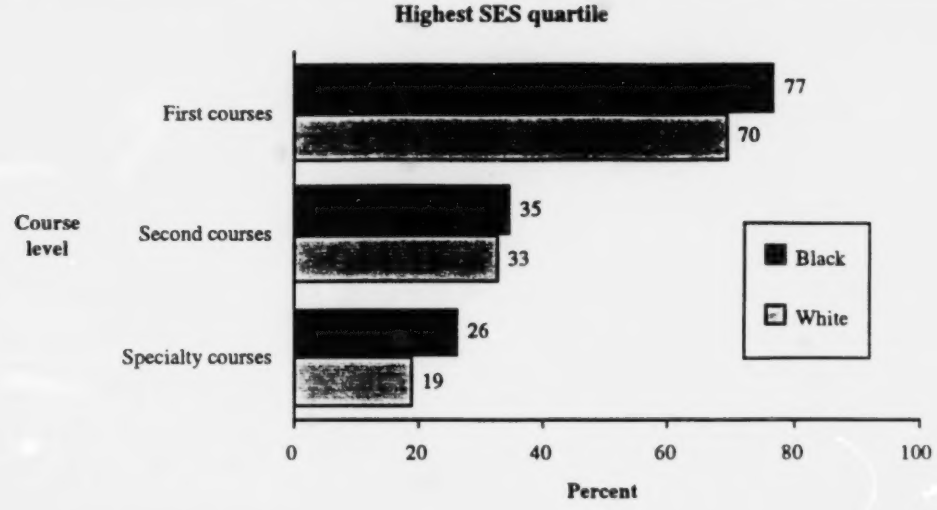
Table 4
Percentage of 1982 public high school seniors completing at least one specific labor market preparation course, by level of course and by race ethnicity and gender

	First courses	Second courses	Specialty courses
Total	79	43	22
Race ethnicity			
Native American	88	55	18
Asian	70	34	17
Hispanic	82	44	21
Black, nonHispanic	79	40	20
White, nonHispanic	79	43	23
Gender and race ethnicity			
Females			
Native American	82	55	23
Asian	63	39	11
Hispanic	79	44	20
Black, nonHispanic	77	42	22
White, nonHispanic	74	42	22
Males			
Native American	91	55	16
Asian	75	31	22
Hispanic	84	45	23
Black, nonHispanic	82	38	18
White, nonHispanic	84	45	24

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

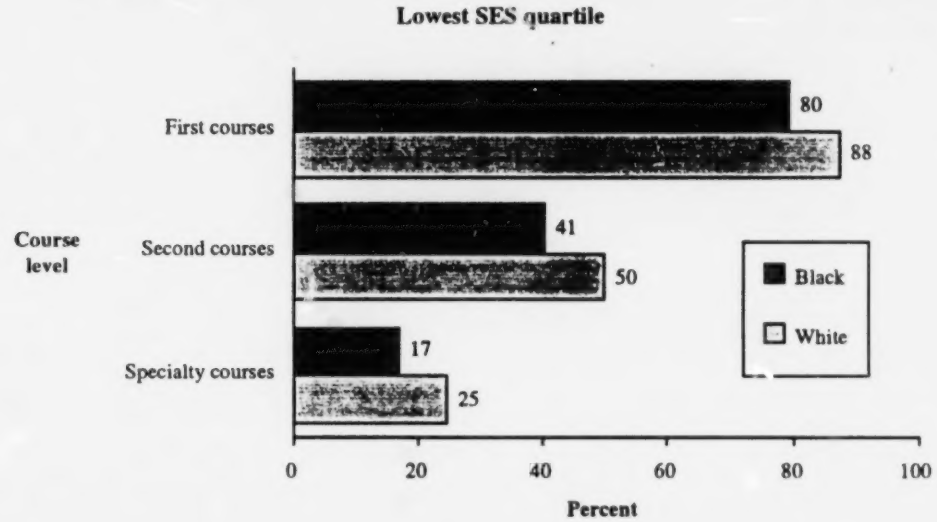
Among students from the highest SES backgrounds, Black and white students were just as likely to take first, second, and specialty SLMP courses (see Figure 2a). However, Black students from the lowest SES backgrounds were less likely than whites from similar backgrounds to take a first course (80% versus 88%), a second course (41% versus 50%), or a specialty course (17% versus 25%) (see Figure 2b). Again, it was among students from the lowest SES backgrounds that Blacks differed most from whites.

Figure 2a
Percentage of Black and white 1982 public high school seniors in the highest socioeconomic status (SES) quartile completing at least one specific labor market preparation course, by course level



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Figure 2b
Percentage of Black and white 1982 public high school seniors in the lowest socioeconomic status (SES) quartile completing at least one specific labor market preparation course, by course level



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Among women, Black and white students were equally likely to take first, second, or specialty courses (see Table 4). However, Asian women were less likely than white women to complete any specialty course. Among men, Black and white students were equally likely to take first vocational courses. Although it appears that Black men were less likely than white men to take second and specialty courses, these differences were not statistically significant.

Students who took specific labor market preparation courses earned, on average, 3.4 Carnegie units in SLMP (see Table 5).[4] Among those who took any SLMP courses, Black and white students earned similar numbers of Carnegie units overall. However, Asian students earned significantly fewer units than whites. Among women, men, and those from the higher SES backgrounds, Black and white students also earned similar numbers of Carnegie units. However, among students from the lower SES backgrounds, Blacks appear to average one-half units fewer than whites. Although these differences were not statistically significant, one-half unit represented one semester less in SLMP courses, and this difference reflected the general trend of lower participation among Black students from lower SES backgrounds.

Table 5
Average Carnegie units earned by 1982 public high school seniors who completed at least one specific labor market preparation course, by socioeconomic status and gender, and by race ethnicity

		Socioeconomic status				Gender	
	Total	Lowest quartile	Second quartile	Third quartile	Highest quartile	Female	Male
Total	3.4						
Race ethnicity							
Native American	3.7	3.5	—	3.7	—	3.0	4.1
Asian	2.5	2.7	3.0	2.4	1.9	2.2	2.6
Hispanic	3.6	3.9	3.7	3.3	2.9	3.1	4.1
Black, nonHispanic	3.3	3.5	3.2	3.2	2.7	3.1	3.5
White, nonHispanic	3.4	4.0	3.7	3.3	2.6	3.0	3.7

—Sample size too small for reliable estimate.

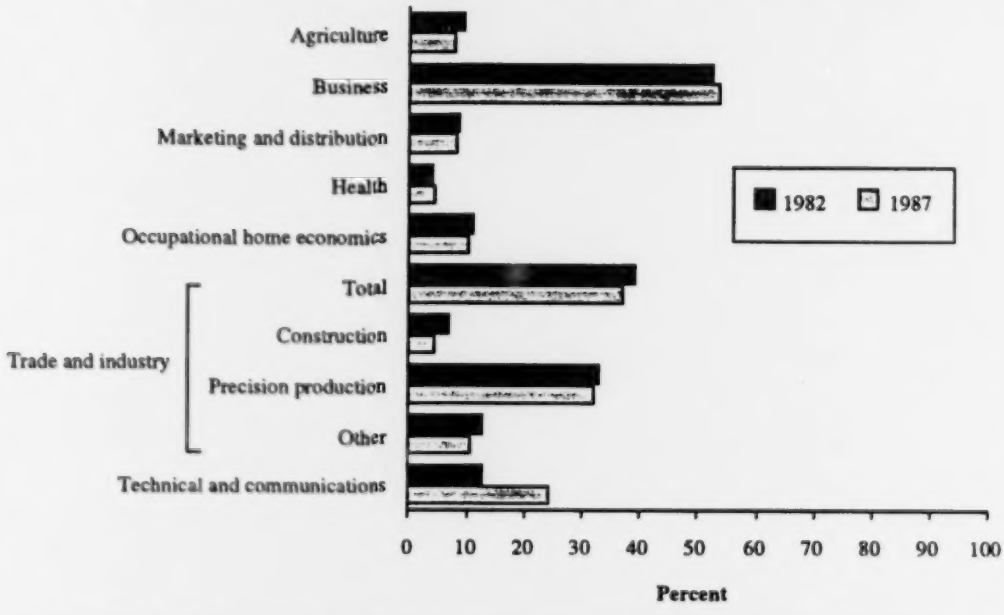
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

[4]Each Carnegie unit represents one yearlong course.

Participation in Specific Labor Market Preparation (SLMP) Program Areas

The most popular SLMP programs in 1982 were business (more than 50% of the students took at least one course in this program) and trade and industry (more than one-third completed a course here) (see Figure 3). Within trade and industry programs, precision production courses were the most popular. One-third of students took at least one course in precision production, which includes drafting as well as welding. The next most popular programs were technical and communications (13%) and occupational home economics (11%).[5] By 1987, students were still most likely to take business courses and trade and industry courses, and courses in precision production were still popular. However, many more students took at least one technical and communication course. Almost one quarter of the students took technical and communication courses in 1987, as opposed to only thirteen percent who took these courses in 1982.

Figure 3
Percentage of 1982 and 1987 public high school seniors completing at least one specific labor market preparation course, by vocational program area



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data, and U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study. See Appendix Tables B-2a and B-2b.

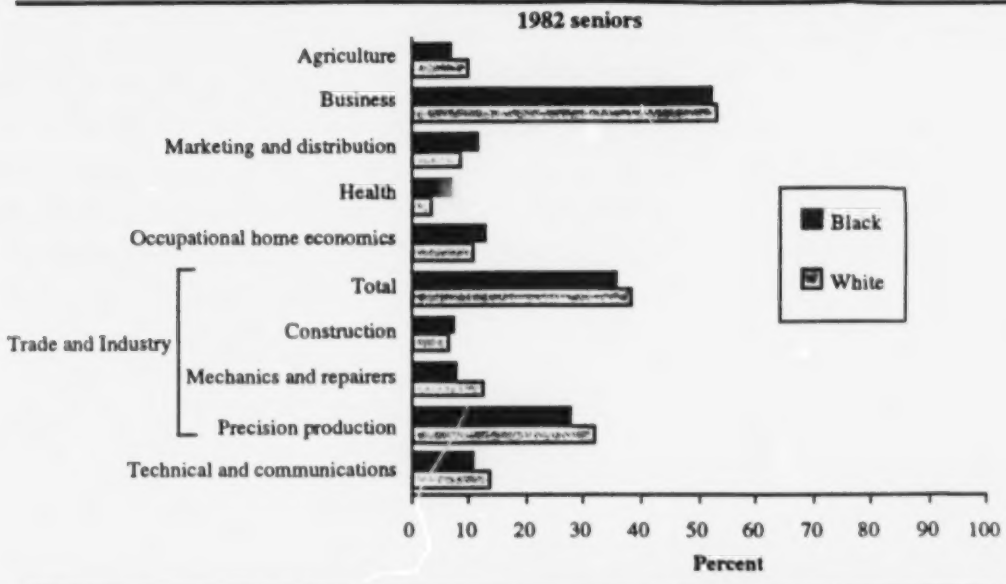
[5]These percentages can add to more than one hundred because students could take courses in more than one area.

In both 1982 and 1987, Black and white students participated equally in most program areas (see Figures 4a and 4b). In 1982, Black students were significantly less likely than white students to take courses in mechanics and repairers, and although this difference was not statistically significant, they were also less likely to take agriculture courses. In all other areas, there were no differences in rates of participation (see Figure 4a). As discussed in the previous section, two different forces may have been at work to make Black students less likely to take mechanics, repairers, and agriculture courses in 1982. First, the history of being limited to these areas may have caused many Black students to avoid these courses. Mechanics, repair, and agriculture fields may have seemed too similar to the field and farm shop occupations to which Black workers were traditionally confined. In addition, these differences may have reflected a history of exclusion of Blacks from the more skilled trades.

Among 1982 students, Blacks were somewhat more likely than whites to take courses in health and marketing and distribution, although the differences were not statistically significant (see Figure 4a). However, since secondary health programs often teach very low-level skills, and marketing and distribution courses can include low-level retail sales, these students may have acquired relatively low academic and occupational skills in these programs unless higher-level science and marketing skills were also taught.

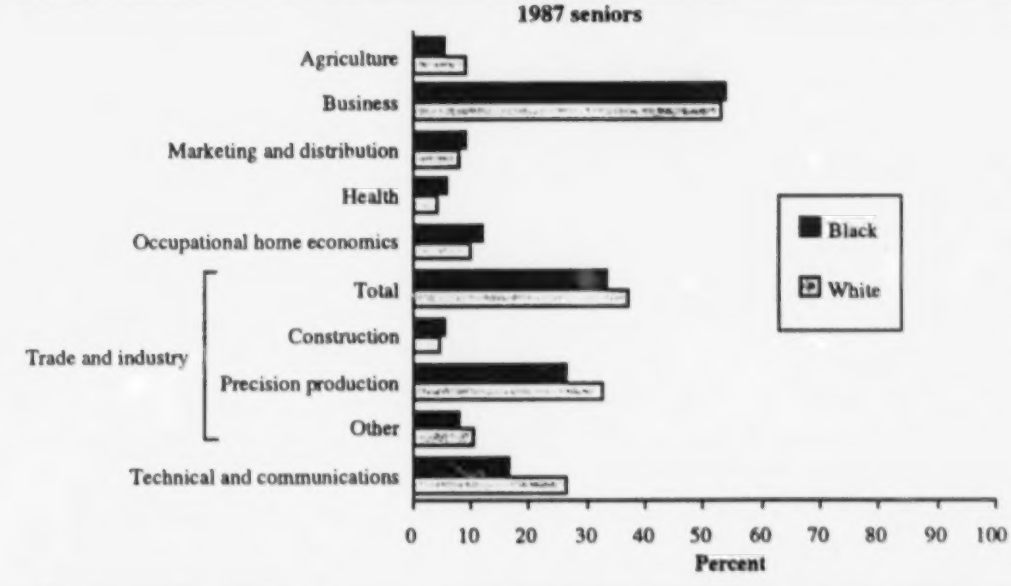
By 1987, however, Black students participated equally with white students in every program area except for technical and communications, where Blacks were less likely than whites to take courses (see Figure 4b). This difference is a concern, since the technical and communication courses include computer programming and engineering as well broadcasting, and these higher skilled fields are expected to grow well into the next century. The reasons for Black underrepresentation here could be a combination of being channeled away from a good preparation in math and science and the continuation of subtle discrimination that discourages Black students from pursuing these jobs.

Figure 4a
Percentage of 1982 Black and white public high school seniors completing at least one specific labor market preparation course, by vocational program area



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data. See Appendix Table B-2a.

Figure 4b
Percentage of 1987 public high school seniors completing at least one specific labor market preparation course, by vocational program area



SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study. See Appendix Table B-2b.

Differences by Socioeconomic Status (SES)

In 1982, students from different SES backgrounds took different courses. Students from high SES backgrounds were less likely than students from low SES backgrounds to take courses in agriculture, business, marketing and distribution, occupational home economics, and construction (see Table 6). However, students from high SES backgrounds were more likely than students from low SES backgrounds to take technical and communication courses.

Table 6
Percentage of 1982 public high school graduates completing one or more courses in specific labor market preparation programs, by socioeconomic status and race ethnicity

						Trade and Industry			
	Agric.	Bus.	Mktg. & dist.	Health	Occ. home ec.	Total	Const.	Mech. and repairers	Prec. prod.	Tech. & comm.
Total	10	53	9	4	11	40	7	13	33	13
Socioeconomic status										
Lowest quartile	11	58	11	5	15	39	9	14	31	10
Second quartile	12	57	9	5	13	42	7	16	14	12
Third quartile	11	53	10	5	11	39	7	14	14	14
Highest quartile	6	44	7	3	8	37	5	11	32	17
Socioeconomic status and race ethnicity[1]										
Lowest quartile										
Black, nonHisp.	9	55	10	7	14	32	8	8	23	10
White, nonHisp.	12	60	12	4	15	40	9	16	33	10
Second quartile										
Black, nonHisp.	7	51	14	7	15	42	9	6	36	12
White, nonHisp.	13	59	9	4	13	40	7	14	34	12
Third quartile										
Black, nonHisp.	4	45	15	7	12	39	7	11	33	11
White, nonHisp.	11	55	9	4	11	38	8	13	32	15
Highest quartile										
Black, nonHisp.	3	52	16	11	7	37	7	8	30	17
White, nonHisp.	5	44	7	3	8	37	5	10	31	17

[1]The sample sizes of Native American, Asian, and Hispanic students were too small for reliable estimates.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

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Again, only among students from lower SES backgrounds did Blacks and whites differ substantially in the types of vocational courses they took. Among students from the two lowest SES quartiles, Blacks were consistently less likely than whites to take courses in mechanics and repairers. Moreover, among those in the lowest SES quartiles, Black students were less likely to take courses in precision production. The question remains whether Black students were avoiding these somewhat well-paying fields or were being discouraged from applying.

In the second highest SES quartile, Blacks were less likely than whites to take agriculture courses. In addition, Black students in the second lowest SES quartile appeared to be less likely to take courses in agriculture, although this was not significant. Thus, in the middle classes, Blacks were either choosing not to participate or were being discouraged from participating in agriculture. Black students could be avoiding agricultural programs due to negative historical associations, or they could be unfamiliar with agricultural occupational options because fewer Blacks now live in rural areas. In addition, as agribusiness grew and the number of small farmers, including Black farmers, decreased, it is possible that Black workers were excluded from the more profitable agricultural occupations. Thus, Black students may have few role models in agriculture. While Blacks and whites appeared to participate equally within the highest SES quartile, this lack of difference could be due to low sample sizes of Black students from high SES backgrounds.

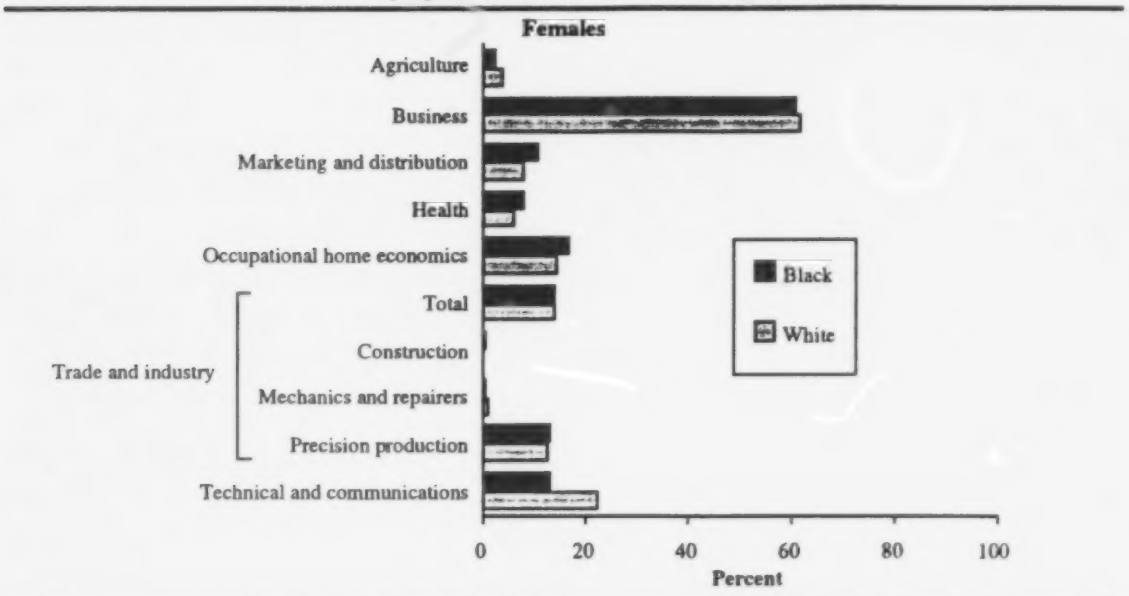
Differences by Gender

In both 1982 and 1987, among both Black and white students, women and men were more likely to be found in vocational programs than is traditional for their sex. For instance, in 1987, women were most likely to take courses in business, which includes the clerical and secretarial programs (see Figure 5a). Men were most likely to take courses in trade and industry, especially in precision production, which includes programs in drafting as well as welding (see Figure 5b).

Among women and men, there were some differences between Black and white students in particular programs. In 1982, Black and white women were equally likely to take courses in all programs (see Appendix B-3a). However, by 1987, Black women took fewer courses than white women in one field—technical and communications (see Figure 5a). While twenty-three percent of white women students took technical and communication courses, only fourteen percent of Black women students took courses in

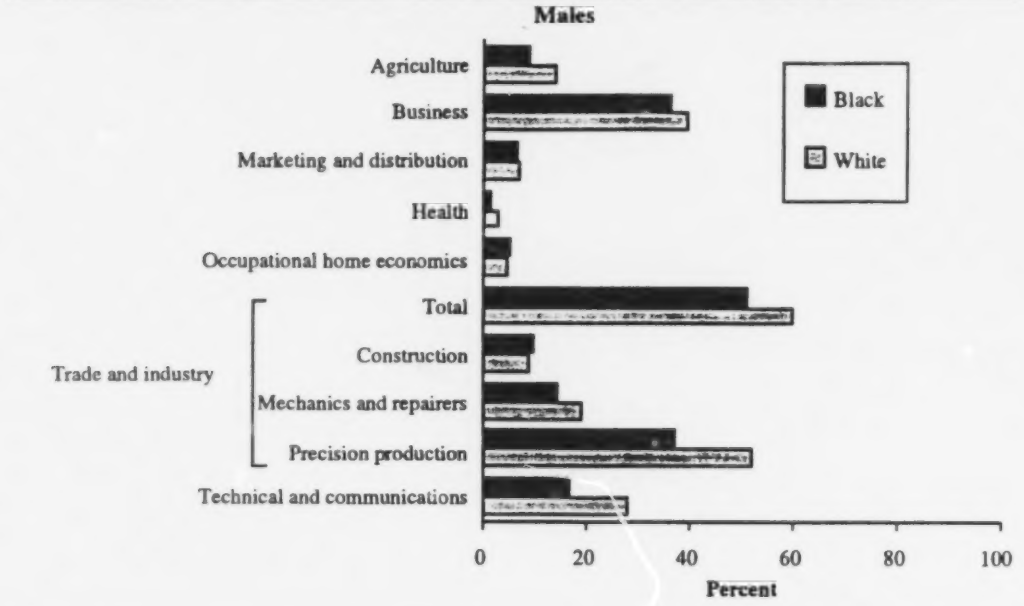
this area. Thus, while Black women participated equally with white women in most traditional and nontraditional programs, they were underrepresented in technical and communication programs. Because those programs lead to jobs that are high level and in demand, patterns in these programs are looked at more closely later in this report.

Figure 5a
Percentage of female Black and white 1987 public high school seniors completing at least one specific labor market preparation course, by vocational program area



SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study. See Appendix Table B-3b.

Figure 5b
Percentage of male Black and white 1987 public high school seniors completing at least one specific labor market preparation course, by vocational program area



SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study. See Appendix Table B-3b.

In 1982, among men, Black students were less likely than whites to take courses in mechanics and repair programs or in technical and communication programs (see Appendix B-3a). By 1987, Black men were still less likely than white men to take courses in technical and communication programs, and they were also less likely to take courses in precision production programs. These programs lead to the best of the skilled trades and white-collar occupations, so participation in the technical and communication programs is examined more closely later in this report.

Differences in Course Levels Taken and in Average Credits Earned

In 1982, within several programs, Black and white students took different amounts of second SLMP courses and specialty SLMP courses. Blacks were less likely than whites to take second-level courses in agriculture and precision production (see Table 7). Blacks were also less likely to take specialty courses in agriculture and although the difference was not significant, it appeared that Blacks were also less likely to take technical and communication specialty courses.

Table 7
Percentage of 1982 public high school graduates completing at least one second-level specific labor market preparation course and at least one specialty-level specific labor market preparation course, by vocational program area and by race ethnicity

						Trade and Industry				
	Agric.	Bus.	Mktg. & dist.	Health	Occ. home ec.	Total	Const.	Mech. and repairers	Prec. prod.	Tech-Tech. & comm.
Second-level courses										
Race ethnicity										
Native American	6	19	1	0	1	30	2	13	16	0
Asian	0	20	<1	<1	1	14	0	3	12	1
Hispanic	3	21	3	1	2	18	2	4	14	<1
Black, nonHisp.	1	21	4	2	2	12	2	2	8	1
White, nonHisp.	3	22	3	<1	1	16	1	3	13	1
Specialty-level courses										
Race ethnicity										
Native American	2	7	4	3	2	<1	—	0	<1	2
Asian	1	4	2	3	2	3	—	0	2	5
Hispanic	5	8	2	1	4	2	—	<1	1	2
Black, nonHisp.	2	8	4	1	4	3	—	1	2	2
White, nonHisp.	4	7	3	1	4	2	—	<1	2	4

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

For each vocational program, the average number of Carnegie units, or credits earned, was calculated for the students who took courses in that program.[6] While these averages varied between Blacks and whites in a few instances, in most programs Black and white students earned similar numbers of credits.

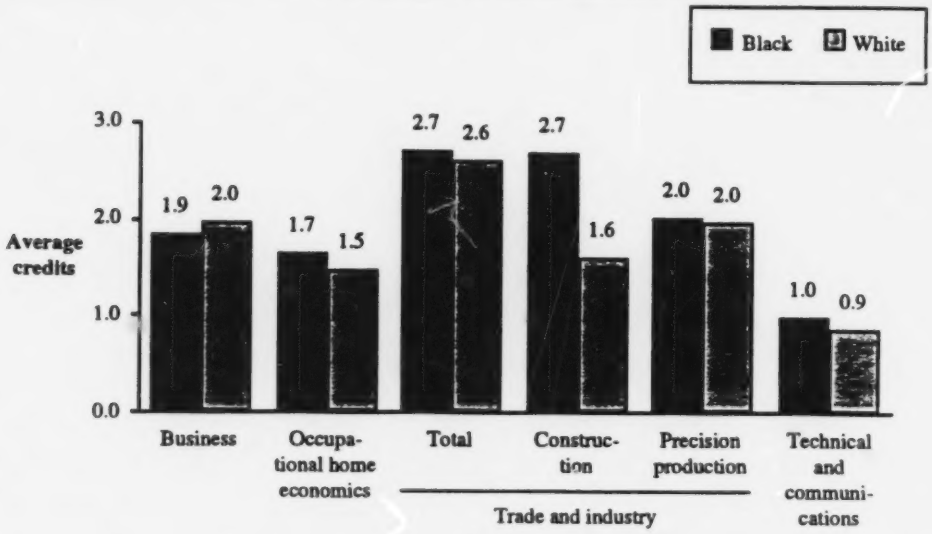
Vocational programs were divided into three groups: (1) programs in which equal percentages of Blacks and whites took courses, (2) programs in which higher percentages of Blacks than whites took courses, and (3) programs in which lower percentages of

[6]This analysis was performed for 1982 students only because credits could not be calculated in a comparable way for 1987.

Blacks took courses. In 1982, among those programs in which Blacks and whites participated equally, Black students averaged different amounts of credits in only one program. They earned almost twice as many credits as white students in construction (see Figure 6a). In the programs of business, occupational home economics, trade and industry, precision production, and technical and communications, Black and white students were equally likely to take courses and earn similar numbers of credits. However, by 1987, the participation of Black students in technical and communication programs had dropped below that of whites.

Among the two programs marketing and distribution and health, in which higher percentages of Black students completed at least one course, Black students averaged more credits in health programs than white students. Thus, Black students were overrepresented in health. While Black students were also more likely to take marketing and distribution courses, those who took those courses averaged similar numbers of credits as white students (see Figure 6b), so the overrepresentation was not as substantial as it was in health. However, the overrepresentation of Black students is still a concern if these programs teach low-level skills. Finally, among the two programs in which lower percentages of Black students took courses, Black students earned many fewer credits in agriculture, and similar credits in mechanics and repairers (see Figure 6c). These results confirm that Blacks were very underrepresented in agriculture programs and somewhat underrepresented in mechanics and repairers programs.

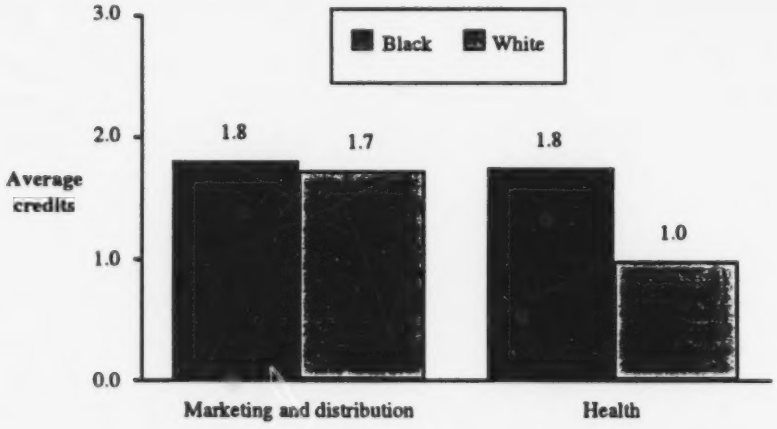
Figure 6a
Average number of credits earned by Black and white 1982 public high school seniors who completed at least one course, by vocational programs in which similar percentages of Black and white students completed at least one course



Vocational programs in which equal percentages of Blacks and whites completed at least one course

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Figure 6b
Average number of credits earned by Black and white 1982 public high school seniors who completed at least one course, by vocational programs in which higher percentages of Black students than white students completed at least one course

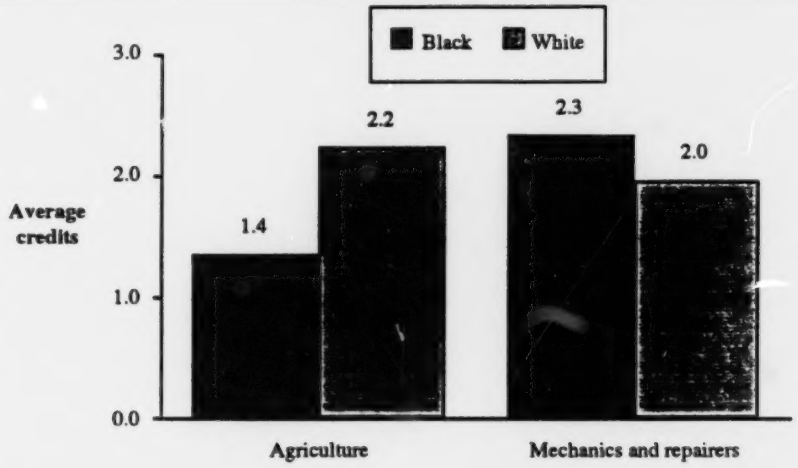


Vocational programs in which higher percentages of Blacks than whites completed at least one course

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Figure 6c

Average number of credits earned by Black and white 1982 public high school seniors who completed at least one course, by vocational programs in which lower percentages of Black students than white students completed at least one course



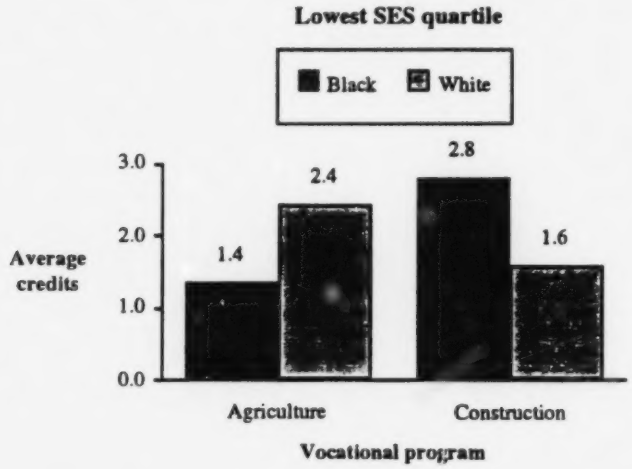
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Differences by SES and Gender

Black and white students from higher SES backgrounds did not differ significantly in the number of credits earned in business or trade and industry programs.[7] Among students from the lowest SES backgrounds, Blacks continued to average fewer credits in agriculture and more credits in construction than did whites (see Figure 7). Blacks from these SES backgrounds were also much less likely than whites to take courses in agriculture, but equally likely to take construction courses. Therefore, low SES Black students took fewer agriculture courses but took more courses in construction than low SES white students.

[7]However, credits in the programs of agriculture, marketing, health, occupational home economics, and technical and communications could not be compared due to the low sample sizes of high SES Blacks.

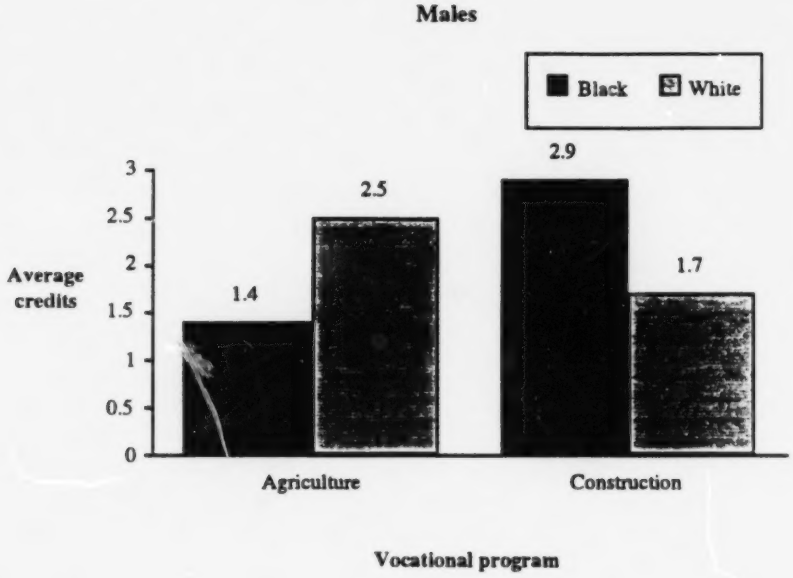
Figure 7
Average number of credits earned by Black and white public 1982 high school seniors in the lowest socioeconomic quartile completing at least one course in agriculture and construction



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Among all women, there were no significant differences in average credits between Black and white students. Among all men, however, Blacks continued to average fewer credits in agriculture and more credits in construction than whites (see Figure 8).

Figure 8
Average number of credits earned by male Black and white public 1982 high school seniors who completed at least one specific labor market preparation course in agriculture and construction



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Participation in Technical and Communication Programs

A major concern of NAABAVE and other Black educators is the low representation of Black students in programs that lead to employment in the high technology sector. In secondary vocational education, technical and communication programs provide an introduction to a wide variety of scientific technology such as computer programming and engineering and electronics systems that could spark a student's interest in these subjects. For this reason, it is important to look closely at the participation of Black students in these programs.

Overall, almost twice as many students took secondary technical and communication courses in 1987 as had taken them in 1982 (see Table 8). Only thirteen percent of all students took these courses in 1982, but by 1987, twenty-three percent enrolled in these courses. However, while students from most racial-ethnic groups

take them. However, while Blacks and whites were equally likely to take second-level courses in technical and communications in 1982, Blacks appeared to be somewhat less likely than whites to take specialty courses in this area (see Table 7).

Table 8
Percentage of 1982 and 1987 public high school seniors completing at least one technical and communication course, by race ethnicity

	1982	1987
Total	13	23
Race ethnicity		
Native American	6	20
Asian	15	30
Hispanic	8	15
Black, nonHispanic	11	17
White, nonHispanic	14	27

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data; Hoachlander (forthcoming), pp. 17-18; and unpublished tabulations from the 1987 High School Transcript Study. See Appendix Tables B-2a and B-2b.

Within SES levels in 1982, Black and white students were equally likely to take these courses (see Table 9). Black and white students also averaged similar numbers of credits earned, both overall and within most SES quartiles (see Table 10). In addition, among students from the second lowest SES level who took technical and communication courses, Blacks averaged slightly more credits than whites in these courses. Thus, in these lower-middle income groups in 1982, Blacks were pursuing these occupations at the same rate as whites or even to a greater extent than whites.

Table 9
Percentage of 1982 public high school seniors completing at least one technical and communication course, by socioeconomic status and by race ethnicity

	Total	Socioeconomic status			
		Lowest quartile	Second quartile	Third quartile	Highest quartile
Race ethnicity					
Native American	6	10	—	4	—
Asian	15	8	13	16	21
Hispanic	8	9	7	7	11
Black, nonHispanic	11	10	12	11	17
White, nonHispanic	14	10	12	15	17

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Table 10
Average credits earned by 1982 high school seniors in technical and communication programs, by socioeconomic status and by race ethnicity

	Total	Socioeconomic status			
		Lowest quartile	Second quartile	Third quartile	Highest quartile
Race ethnicity					
Native American	—	—	—	—	—
Asian	1.1	—	—	—	—
Hispanic	0.9	0.9	0.9	0.9	—
Black, nonHispanic	1.0	0.9	1.2	—	—
White, nonHispanic	0.9	1.2	0.9	0.8	0.8

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

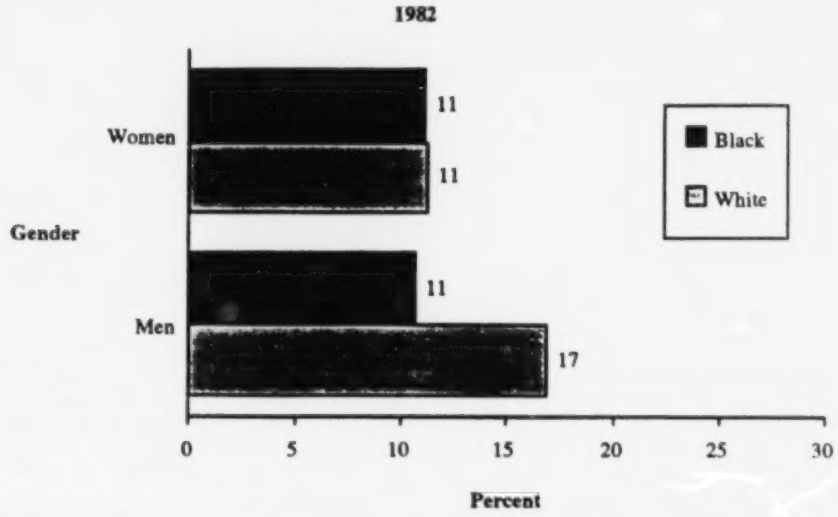
However, by 1987, while more Black students took technical and communication courses than in 1982, they had fallen behind white students and were much less likely to be

taking these courses. While twenty-seven percent of white students took these courses in 1987, only seventeen percent of Black students did. In addition, Hispanic students were still less likely than whites to take technical and communication courses, although they had nearly doubled their participation between 1982 and 1987.

Among Black and white students, women and men participated at different rates in technical and communication courses. In 1982, Black women, Black men, and white women were equally likely to take these courses. However, white men were somewhat more likely than the other groups to take courses in technical and communications, although the difference was not significant (see Figure 9a). Nevertheless, both Black and white women and men who took technical and communication courses earned similar numbers of credits (see Figure 10).

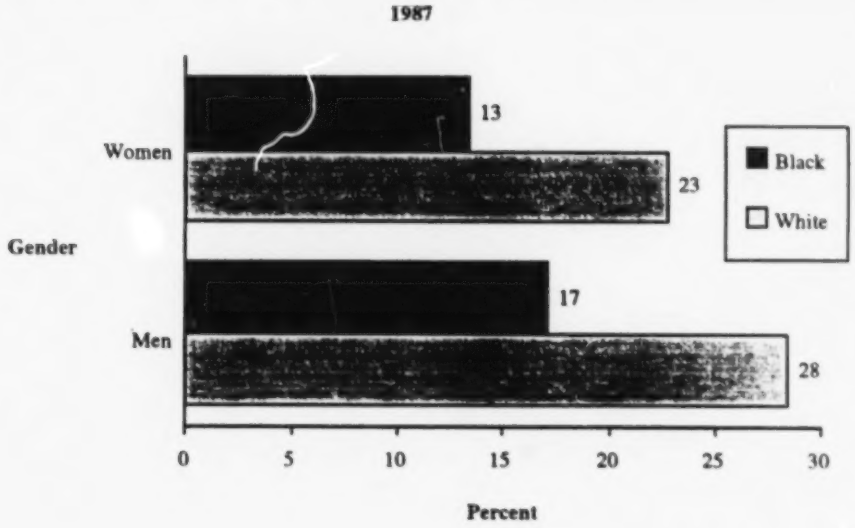
However, by 1987, both Black women and men lagged behind white women and men in participation in these courses (see Figure 9b). White women had more than doubled their participation, almost catching up to white men. White men and Black men had each increased their participation by half. However, Black women had increased their participation only a few percentage points. Thus, by 1987, while Black men had started to enroll in these courses at higher rates, Black women had not.

Figure 9a
Percent of Black and white 1982 public high school seniors completing at least one technical and communications course, by gender



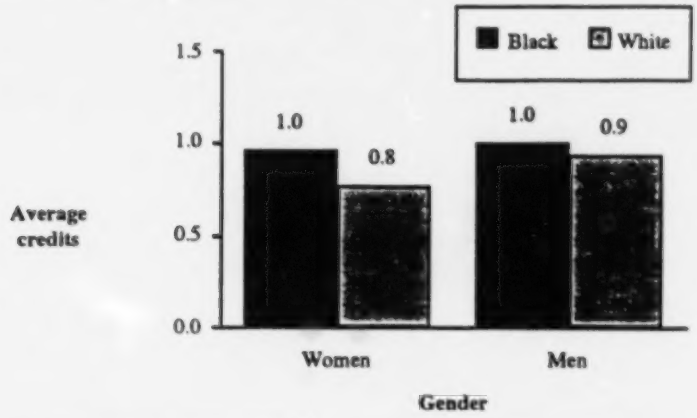
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data. See Appendix Table B-3a.

Figure 9b
Percent of Black and white 1987 public high school seniors completing at least one technical and communications course, by gender



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1987 High School Transcript Study and survey data. See Appendix Table B-3b.

Figure 10
Average credits earned by Black and white public 1982 high school seniors completing at least one technical and communication course, by gender



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Outcomes of Secondary Vocational Education

Regardless of the number of vocational courses they took, Black and white 1982 high school seniors were equally likely to attend postsecondary education (PSE) institutions by 1984 and to attend each of the following types of postsecondary institutions: public four-year, private four-year, public two-year, and less-than-two-year. The only significant attendance difference between Blacks and whites was among seniors who took less than two Carnegie units of vocational courses; Blacks were less likely (69%) than whites (89%) to be attending any PSE institution (see Table 11). This means that thirty-one percent of Black seniors but only eleven percent of whites had not pursued vocational training in high school and did not enroll in PSE within the first two years after graduation. Some of these students could be planning to pursue more education in the future. However, all were most likely disadvantaged in a labor market that values training, experience, or higher education.

Although not significantly different, it is interesting to note that among Blacks and whites who took eight or more Carnegie units in vocational courses, fifty-one percent of Blacks attended PSE, while only thirty-seven percent of whites started PSE within two

years after graduation (see Table 11). Thus, taking vocational coursework in high school does not seem to discourage Black students from pursuing PSE.

Table 11
Percentage of 1982 public high school seniors attending any postsecondary institutions and public two-year institutions by 1984, by number of Carnegie units accumulated in vocational education in high school and by race ethnicity

	Number of vocational Carnegie units				
	0.0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0 or more
Attending any postsecondary institution					
Race ethnicity[1]					
Hispanic	76	58	40	32	38
Black, nonHispanic	69	68	57	56	51
White, nonHispanic	89	78	61	46	37
Attending public two-year institution					
Race ethnicity[1]					
Hispanic	37	25	23	17	14
Black, nonHispanic	16	25	23	18	15
White, nonHispanic	24	28	24	20	17

[1]The sample sizes of Native American and Asian students were too small for reliable estimates.

SOURCE: Hoachlander, Kaufman, and Levesque (1992), Table 17, from the High School and Beyond Sophomore Cohort 1982 High School Transcript Study and Base Year through Second Follow-up surveys.

Among Black and white 1982 seniors who were *not* attending PSE six months after high school graduation, Blacks appeared to be more likely to be unemployed than whites. However, the only significant difference was among those who had earned eight or more units in vocational education (see Table 12). Of these seniors, thirty-five percent of the Blacks were unemployed compared with seven percent of the whites. This high unemployment rate is discouraging, especially if it reflects the value of secondary vocational education for Black students in the labor market. If secondary vocational education is not as likely to lead to employment for Black students as for white students,

then this lack of economic return of vocational education may explain why more Black than white vocational students went on to PSE after high school graduation.

Table 12
Percentage of 1982 public high school seniors who accumulated 8.0 or more vocational Carnegie units by labor market participation, by postsecondary attendance six months after high school graduation and race ethnicity

	Employed full-time	Employed part-time	Unemployed	Not in labor force
Not attending postsecondary education				
Race ethnicity[1]				
Hispanic	49	14	10	27
Black, nonHispanic	33	8	35	25
White, nonHispanic	53	16	7	24
Attending postsecondary education				
Race ethnicity[1]				
Hispanic	17	27	4	52
Black, nonHispanic	27	8	9	57
White, nonHispanic	20	39	6	37

[1]The sample sizes of Native American and Asian students were too small for reliable estimates.

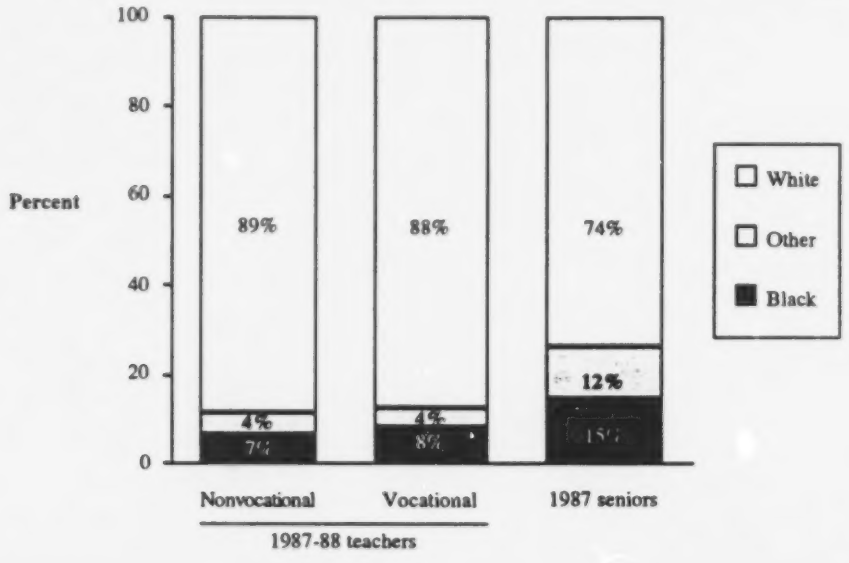
SOURCE: Hoachlander et al. (1992), Tables 18 and 19, from the High School and Beyond Sophomore Cohort 1982 High School Transcript Study and Base Year through Second Follow-up surveys.

Of the Black and white 1982 seniors who were attending postsecondary institutions, the only difference between the two groups was that among those who had earned eight or more units in vocational education, Black students were much less likely than white students to be working part time. However, while higher percentages of Black students seemed to be out of the labor force, it is not possible to determine whether these Black students were not working because they were more likely than white students to be supported in college by their colleges or parents, or because they had more difficulty than white students in finding part-time jobs.

Secondary Vocational Teachers

The majority of secondary teachers in 1987 were white, and whites were equally represented among both vocational and nonvocational teachers (see Figure 11). Eighty-eight percent of vocational teachers were white, as were eighty-nine percent of nonvocational teachers. Vocational teachers were slightly more likely than nonvocational teachers to be Black. While eight percent of vocational teachers were Black, only seven percent of nonvocational teachers were Black. However, this was still lower than the representation of Black students among 1982 seniors, fifteen percent of whom were Black. Thus, Black students have few role models in vocational education, especially since it is likely that most Black vocational instructors teach in the traditionally Black subjects of agriculture and industrial arts.

Figure 11
Percentage distribution of 1987-88 nonvocational and vocational public school teachers of grades 9 through 12 and 1987 high school seniors who completed at least one specific labor market preparation course, by race ethnicity



SOURCE: Kaufman (forthcoming), p. 5, from the 1987–88 School and Staffing survey; and the U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study.

Summary

In secondary vocational education, Black students were just as likely as white students to take vocational courses. However, this equality masks important differences in participation within SES levels and vocational program areas. For the most part, Black students from the upper three SES quartiles took vocational courses in similar amounts and programs as white students. However, among students from lower SES backgrounds, Black students were consistently less likely to take vocational courses and took fewer credits when they took them. Specifically, they were less likely to take courses in mechanics and repairers, precision production, and agriculture, programs that include both high- and low-level skills. Thus, the students from low SES backgrounds who were mostly likely to be tracked into nonacademic high school programs and who were least likely to pursue postsecondary education had less vocational training. If vocational education, especially in these skills, does not contribute to either academic achievement or labor market success, then this is not a problem. However, if it does contribute to achievement or success, then students are losing out on important education.

While Black students were equal to whites in vocational course taking overall, there were several programs in which Blacks lagged behind whites in 1987. Most importantly, they were much less likely than whites to take technical and communication courses. This is a concern because training in these higher-level skill areas provides the best preparation for academic achievement, PSE, and labor market employment. In addition, Black men were less likely than white men to take courses in trade and industry, specifically in precision production, which includes drafting and engineering as well as welding. These patterns suggest that Black students may be participating less in programs that lead to lucrative jobs such as technical and communications, mechanics, and trade and industry, and may be participating more in low-level programs such as health, that may lead to dead-end jobs.

For the most part, Black 1982 high school seniors were just as likely to pursue all types of PSE by 1984 as white students, no matter how many vocational courses they had taken. However, among students who took the most vocational courses and who did not attend PSE, Blacks had much higher unemployment rates than whites, so vocational education may not have been helpful to many Blacks in the labor market. Finally, Blacks were underrepresented among vocational teachers compared to the percentage of vocational students who are Black.

Participation in Postsecondary Vocational Education

Overall Participation

Of the 1980 high school seniors who attended postsecondary institutions by 1984, most enrolled in public four-year institutions (49%) and public two-year institutions (42%). The rest attended private four-year institutions (22%), public vocational-technical institutes (3%), private proprietary schools (5%), and private less-than-four-year institutions (3%) (see Table 13).

Table 13
Percentage distribution of 1980 high school seniors enrolled in postsecondary institutions by 1984, by type of institution and by race ethnicity

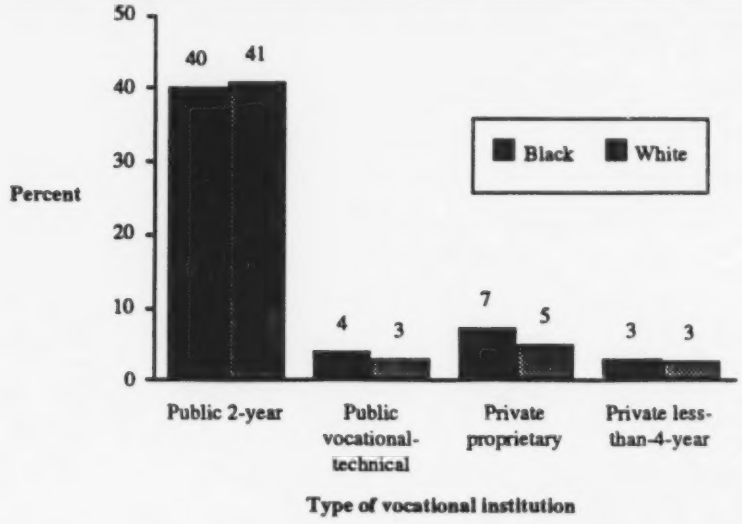
	All post-secondary institutions	Type of postsecondary institution					
		Public 4-year	Private 4-year	Public 2-year	Public vocational technical	Private proprietary	Private less-than-4-year
Total	100	49	22	42	3	5	3
Race ethnicity							
Native American	100	40	14	58	9	4	4
Asian	100	59	18	47	—	4	1
Hispanic	100	38	14	58	4	6	1
Black, nonHispanic	100	47	18	40	4	7	3
White, nonHispanic	100	49	23	41	3	5	3

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Black and white students were equally likely to attend the postsecondary institutions providing most of the vocational education: public two-year institutions, public vocational-technical institutes, private proprietary schools, and private less-than-four-year institutions (see Figure 12). Although Blacks appeared more likely than whites to be attending private proprietary schools, the difference was not statistically significant.

Figure 12
Percentage of Black and white 1980 high school seniors enrolled in vocational postsecondary institutions by 1984, by type of institution



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Similarly, among women, Blacks appeared to be slightly more likely than whites to attend public vocational institutes and private proprietary schools, but the differences were not significant. Among men, Blacks and whites had equal attendance patterns (see Table 14). However, as found in secondary vocational education, the main difference between Black and white students in access to vocational education occurred among students from low SES backgrounds. Among seniors in the lowest SES quartile, Blacks were significantly less likely than whites (38% versus 48%) to attend public two-year institutions, which were the institutions that were the most likely to provide vocational education to this cohort.

Table 14
Percentage of Black and white 1980 high school seniors enrolled in vocational institutions by 1984, by type of institution and by socioeconomic status and gender

	Type of vocational postsecondary institution			
	Public 2-year	Public vocational technical	Private proprietary	Private less-than-4-year
Socioeconomic status				
Lowest quartile				
Black, nonHispanic	38	6	10	3
White, nonHispanic	48	6	7	4
Second quartile				
Black, nonHispanic	41	3	6	3
White, nonHispanic	46	5	7	2
Third quartile				
Black, nonHispanic	43	2	7	4
White, nonHispanic	45	3	5	3
Highest quartile				
Black, nonHispanic	38	—	2	—
White, nonHispanic	33	1	3	3
Gender				
Female				
Black, nonHispanic	40	5	10	3
White, nonHispanic	41	2	7	4
Male				
Black, nonHispanic	41	3	3	3
White, nonHispanic	40	4	3	2

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Participation by Program in the Four Vocational Types of PSE Institutions

Within each type of vocational education institution, Black and white students differed in the percentage who attempted at least one course in several of the ten major vocational programs (see Table 15). In public two-year institutions, Black students were less likely than white students to have attempted courses in agriculture, home economics,

and trade and industry. These differences may indicate that Blacks were avoiding these traditionally Black programs. Students at these institutions are examined further in the next section.

In public vocational-technical institutes, Blacks were less likely than whites to have attempted courses in agriculture, marketing and distribution, and engineering/science technologies which indicates an underrepresentation of Blacks in both the low-level traditional and the high-level new programs. However, Blacks were much *more* likely than whites to attempt courses in computer/data processing programs, so these institutions may be doing well at getting Black students involved in these areas. In contrast, among 1980 seniors attending private proprietary schools, white students were much more likely than Black students to attempt courses in computers/data processing and communication technologies, so these types of institutions were not doing well at encouraging Black students to work in these technical fields. In less-than-four-year institutions, many of which are nursing schools, Blacks were much less likely than whites to attempt courses in health. Since Black students were equally likely or slightly more likely than whites to participate in secondary vocational health programs, this difference is puzzling. However, since health programs are usually more technical at the postsecondary level and since private less-than-four-year institutions cost more than public institutions, these Black students may not have had either the academic preparation or financial support to pursue these degrees at the postsecondary level in these institutions.

Because the majority of students in postsecondary vocational education attended public two-year institutions (40% of Blacks and 41% of whites), the rest of this analysis on postsecondary participation will focus on students in those institutions.

Table 15
Percentage of Black and white 1980 high school seniors enrolled in postsecondary institutions, by 1984 attempting at least one course in vocational program areas and by type of postsecondary institutions attended

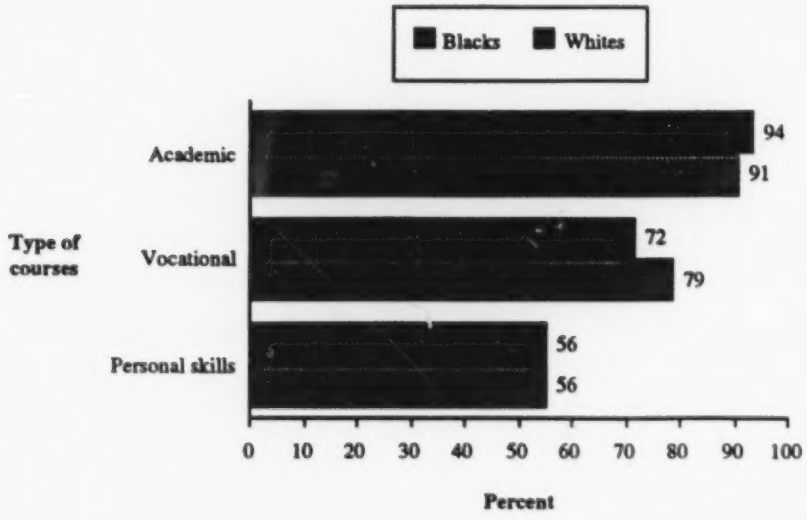
Type of postsecondary institution	Agric.	Bus. and office	Mktg. and dist.	Health	Home ec.	Comp./ data proc.	Eng./ science	Prot. services	Comm.	Trade and ind.
Public 2-year										
Black, nonHispanic	1	50	7	9	13	23	7	4	1	8
White, nonHispanic	4	49	8	11	19	25	12	6	1	13
Public vocational-technical										
Black, nonHispanic	0	39	3	12	14	29	10	0	2	20
White, nonHispanic	10	40	13	15	17	17	23	0	2	34
Private proprietary										
Black, nonHispanic	0	55	18	11	13	13	9	0	0	31
White, nonHispanic	1	52	15	9	12	22	13	0	4	30
Private less-than-4-year										
Black, nonHispanic	0	41	6	6	26	15	6	3	2	7
White, nonHispanic	3	49	9	29	31	23	9	2	0	6

SOURCE: Hoachlander et al. (1992), Tables 37-40, from the High School and Beyond Sophomore Cohort 1982 High School Transcript Study and Base Year through Second Follow-up surveys.

Participation in Public Two-Year Institutions

Of the 1980 seniors who pursued postsecondary education in public two-year institutions by 1984, the majority of Black and white students completed at least one vocational course (see Figure 13). However, although Blacks and whites were equally likely to complete academic and personal skills courses, Blacks were somewhat less likely than whites to complete vocational courses (72% and 79%, respectively).

Figure 13
Percentage of Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 completing one or more courses, by type of course



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Within each level of SES background, Black and white students did not differ in vocational course completion (see Table 16). In addition, there were no differences between Black women and white women in vocational participation. However, Black men were somewhat less likely (71%) to complete vocational courses than white men (84%). While this difference was not significant, it suggests that higher percentages of Black men than white men were concentrating exclusively in academic courses rather than taking vocational courses.

Table 16
Percentage of Black and white 1980 high school seniors enrolled in public two-year institutions completing one or more vocational courses, by socioeconomic status and gender and by race ethnicity

	Socioeconomic status				Gender	
	Lowest quartile	Second quartile	Third quartile	Highest quartile	Female	Male
Race ethnicity						
Native American	79	—	—	—	81	72
Asian	87	86	77	76	74	78
Hispanic	88	79	85	74	82	80
Black, nonHispanic	75	77	75	78	73	71
White, nonHispanic	80	81	81	73	75	84

—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

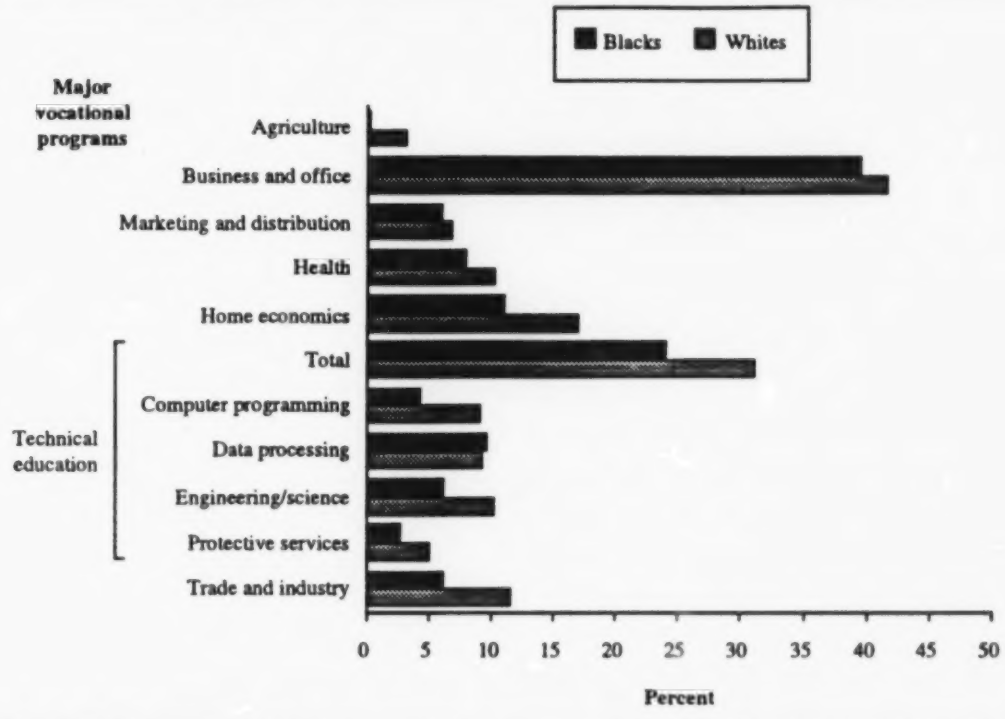
Participation by Program in Public Two-Year Institutions

The most popular vocational programs for 1980 high school seniors enrolled in public two-year institutions by 1984 were business and office, and technical education (see Figure 14). In business and office programs, Black students were just as likely as white students to complete courses. Although Blacks appeared to be less likely than whites to complete technical education courses, the difference was not significant. In three additional programs, Black students did not differ from whites in participation. Black students were just as likely as whites to complete at least one course in data processing, marketing and distribution, and health. All of these programs can prepare students for responsible positions, although there are some business and office and data processing jobs that offer low wages and little advancement. For instance, data processing could lead to low-level data entry jobs. However, it was not possible to tell whether Black students were more likely than white students to obtain those jobs.

In four vocational program areas, Blacks in this cohort were less likely than whites to complete courses. Specifically, Black students were less likely than whites to complete any courses in agriculture, home economics, computer programming, and trade and industry. These programs are a combination of the traditional programs for Blacks

(agriculture, home economics, trade and industry) and a newer and more highly skilled program (computer programming). Trade and industry programs cover trades from construction and automotive to drafting and cosmetology, so it is difficult to interpret lower participation rates in that area. However, since the field of computer programming offers technical skills in a field that is rapidly growing, it is possible that Black students may either be avoiding or being discouraged from a program that could give them increased technical job opportunities.

Figure 14
Percentage of Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 completing one or more courses, by major vocational program areas



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys. See Appendix Table B-4.

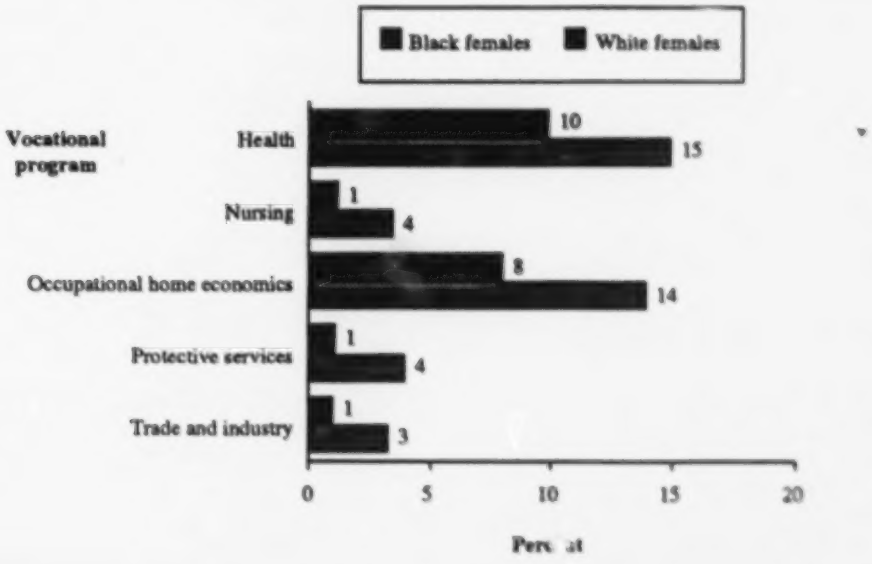
Differences Within SES

Within each SES level, Black and white students did not differ significantly in participation in particular vocational programs. In some cases, this lack of difference could be due to low sample sizes of Blacks within each SES level and vocational program. In other cases, participation differences between Blacks and whites may not have been large within each SES level, but they added up to overall differences between Blacks and whites. Another explanation for the lack of differences within SES levels is that what appeared to be participation differences between Black and white students at an overall level were actually differences between students of different SES levels.

Differences Within Gender

Black women were less likely than white women to take courses in protective services (see Figure 15). This difference may reflect a long history of racism and sexism by police and fire departments that would make Black women the least likely group to choose those occupations. In addition, although differences were not significant, Black women were somewhat less likely than white women to take courses in health, nursing, occupational home economics, and trade and industry. Health programs at a postsecondary level include a much higher level and more diverse set of skills than those at the secondary level, and Black women may not be able to take advantage of well-paying jobs in a wide variety of health careers, including nursing, if they are not as likely as white women to take courses in these areas.

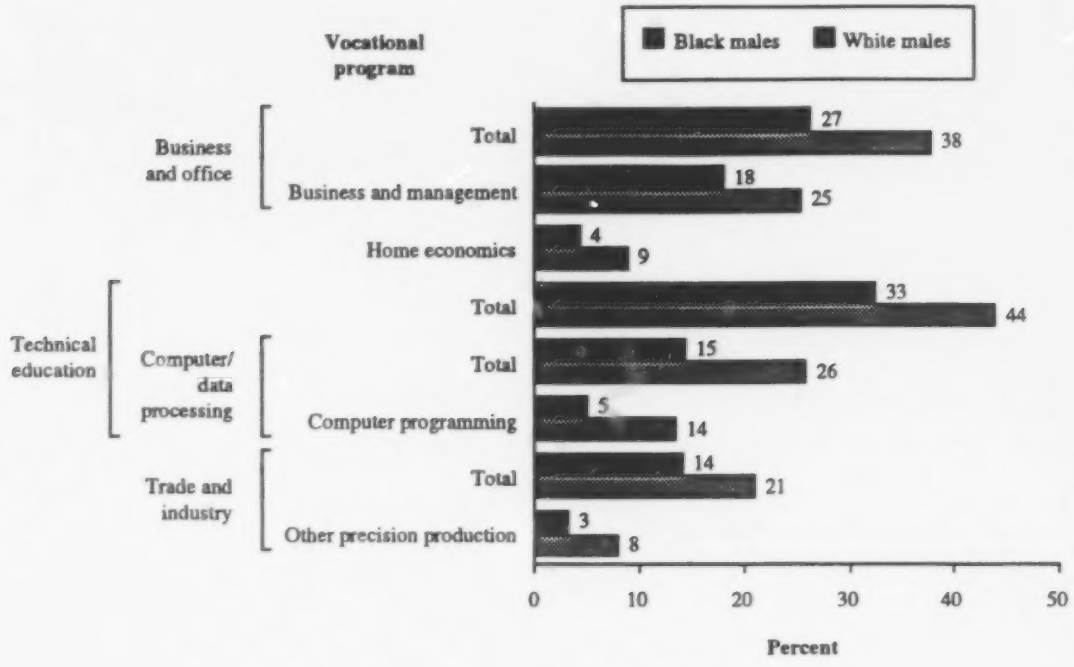
Figure 15
Percentage of Black and white female 1980 high school seniors enrolled in public two-year institutions by 1984 completing one or more vocational courses, by vocational programs



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Black men were significantly less likely than white men to take courses in computer/data processing, computer programming, and other precision production (see Figure 16). In addition, nonsignificant differences suggest that Black men may be less likely than white men to take courses in business and office, business and management, home economics, technical education, and trade and industry. Thus, compared with white men, Black men seem to be underrepresented in all the programs that might lead to highly skilled and well-paid work.

Figure 16
Percentage of Black and white male 1980 high school seniors enrolled in public two-year institutions by 1984 completing one or more vocational courses, by selected vocational programs



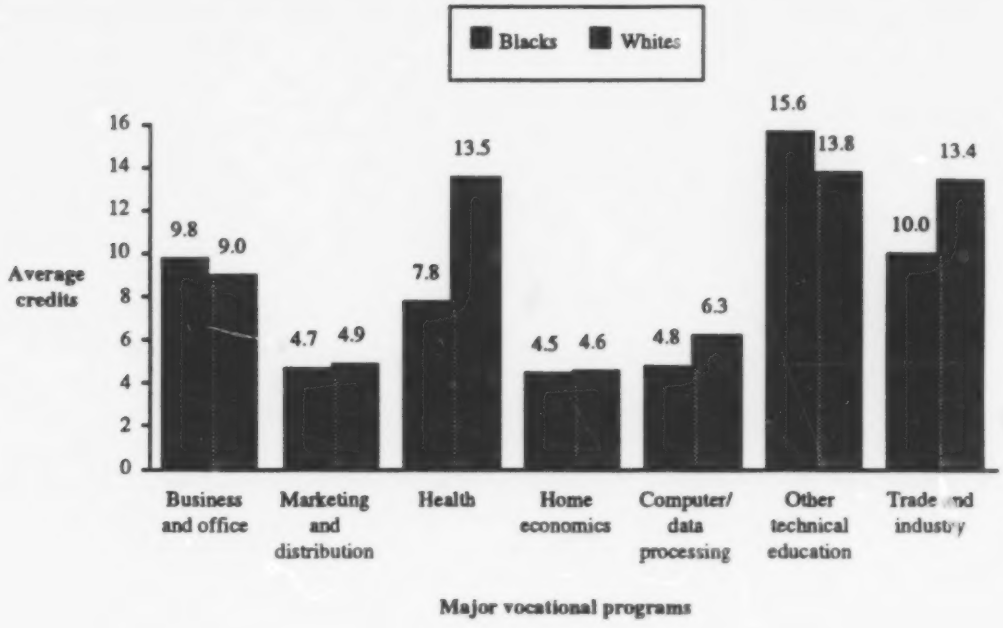
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Differences in Average Credits Earned

Black and white students in public two-year institutions appeared to average different numbers of credits in several of the major vocational program areas in which they took courses (see Figure 17). However, in only one program was the difference significant. Blacks averaged more credits than whites in other business and office programs, which include the higher-level financial management and systems analysis courses (see Table 17). Since Black and white students were equally likely to take courses in this area, Black students may be obtaining more training than whites in these aspects of business.

Figure 17

Average number of credits earned by Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 who completed one or more courses in major vocational program areas



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Table 17
Average credits accumulated by Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 who completed one or more courses in vocational program areas and by selected detailed vocational program

	Black	White
Agriculture	—	10.4
Business and office	9.8	9.0
Accounting	4.9	6.0
Other	6.4	4.4
Marketing and distribution	4.7	4.9
Health	7.8	13.5
Home economics	4.5	4.6
Technical education	8.4	10.0
Computers/data processing	4.8	6.3
Computer programming	4.5	6.3
Engineering/science	15.6	13.8
Protective services	—	7.7
Trade and industry	10.0	13.4

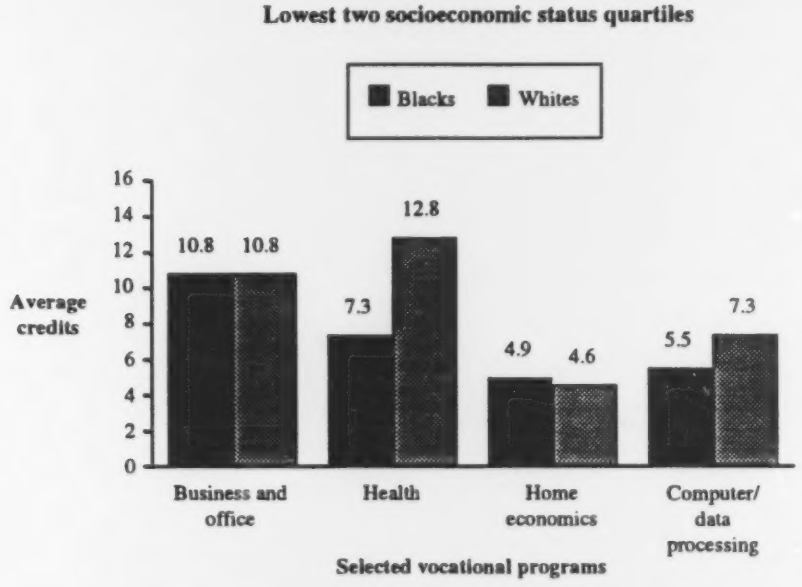
—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

In addition, two of these nonsignificant differences reflected trends discussed earlier. Blacks appeared to average somewhat fewer credits than whites in the program areas of health and computer programming (see Figure 17). As discussed earlier, while Black students were as likely as white students to take health courses overall, Black women may be less likely than white women to take health courses. These lower credit averages suggest that Black students, and especially Black women, may be obtaining a lower amount of training in health careers than white students. Likewise, since Black men were less likely to take courses in computer programming, these lower credit averages suggest that Black students, especially Black men, may be obtaining less training than whites in this area as well.

Of those who took courses in the major vocational programs of business and office, health, home economics, and computer/data processing, Black and white students from similar SES backgrounds did not differ significantly in average numbers of credits earned.[8] However, two nonsignificant findings reflected trends reported earlier. Among students from lower SES backgrounds, Blacks appeared to average fewer credits than whites in health (see Figure 18a). This difference suggests that along with Black women, Black students from lower SES backgrounds may be obtaining less health training than similar white students. In addition, among students in the higher SES levels, Blacks appeared to average fewer credits than whites in computer/data processing (see Figure 18b). Like Black men, Black students from higher SES backgrounds may be obtaining less training than similar white students in these programs.

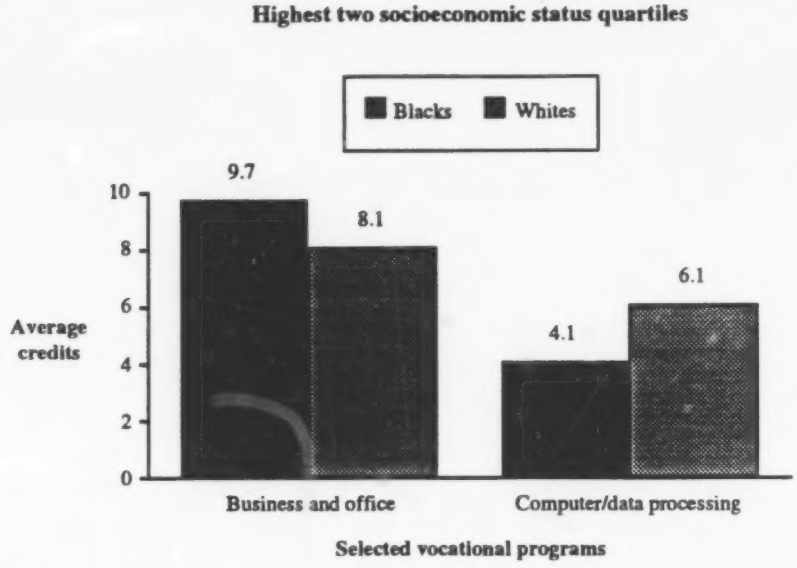
Figure 18a
Average number of credits earned by Black and white 1980 high school seniors in the lowest two socioeconomic status quartiles enrolled in public two-year institutions by 1984 who completed one or more courses in selected vocational program areas



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

[8]These were the only programs in which an adequate sample of both Black and white students had taken courses when divided by two SES levels. Two SES levels were created by grouping the SES quartiles into the lower half and the upper half.

Figure 18b
Average number of credits earned by Black and white 1980 high school seniors in the highest two socioeconomic status quartiles enrolled in public two-year institutions by 1984 who completed one or more courses in selected vocational program areas



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Among all men, there were no differences between Blacks and whites in credits earned in the three major programs in which average credits could be calculated (Table 18). Although the difference was not significant, Black women appeared to earn fewer credits in health than white women. This difference supports earlier findings that Black women were obtaining less postsecondary health training than white women.

Table 18
Average credits accumulated by Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 who completed one or more courses in vocational program areas, by gender and by detailed vocational program

	Females		Males	
	Black	White	Black	White
Agriculture	—	—	—	12.6
Business and office	10.4	10.1	8.0	7.4
Marketing and distribution	5.1	5.0	—	4.8
Health	8.5	14.4	—	10.8
Home economics	4.8	5.0	—	3.9
Computers/data processing	4.5	6.0	5.3	6.4
Other technical education	—	—	—	14.7
Trade and industry	—	—	10.7	14.0

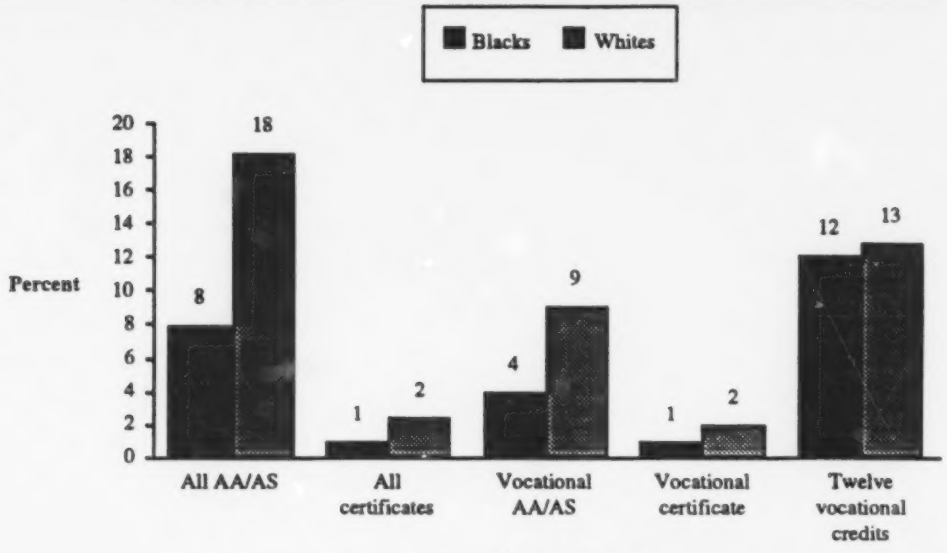
—Sample size too small for reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Completion Rates in Public Two-Year Institutions

Of the 1980 high school class enrolled in public two-year institutions, Black students were significantly less likely than white students to complete any associate's degree or, specifically, a vocational associate's degree in the four years after high school graduation (Figure 19). However, although Black and white students differed in these rates of degree completion, Black and white noncompleters were equally likely to leave school with twelve credits earned in a vocational program area. Thus, while Blacks were less likely than whites to complete vocational degrees, they were as likely as noncompleting whites to leave postsecondary education with a substantial number of vocational credits completed.

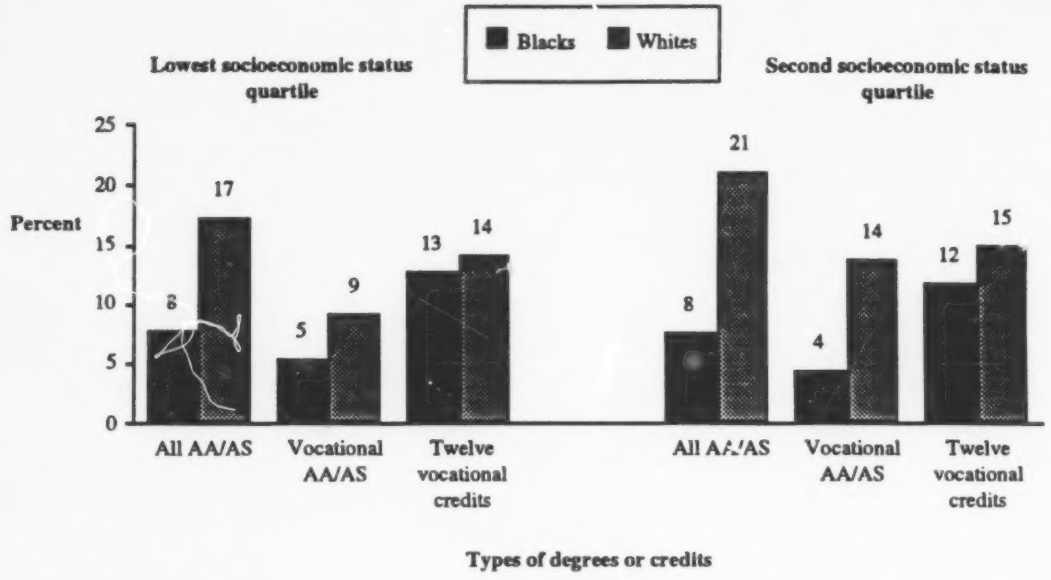
Figure 19
Percentage of Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 completing degrees and certificates and earning twelve vocational credits by 1984



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Like Black and white students overall, Black students from lower SES backgrounds were less likely than whites from the same background to complete any associate's degree or a vocational associate's degree, and they were equally likely to earn twelve credits in a vocational program area (see Figure 20). However, Black and white students from upper SES backgrounds did not differ in degree completion rates. Thus, similar to findings in secondary and postsecondary vocational education participation, it was only among lower SES students that Black students differed from white students.

Figure 20
Percentage of Black and white 1980 high school seniors enrolled in public two-year institutions by 1984 completing all degrees and vocational degrees and earning twelve vocational credits by 1984, by the two lowest socioeconomic quartiles



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

When men and women were examined separately, Black and white students were equally likely to earn twelve credits in a vocational program area (see Table 19). Among men, Black students were much less likely than white students to complete any associate's degree or a vocational associate's degree. Among women, Blacks were also less likely than whites to complete any associate's degree. However, Black women were about as likely as white women to complete a vocational associate's degree.

Table 19
Percentage of 1980 high school seniors enrolled in public two-year institutions by 1984 completing all degrees and vocational degrees and earning twelve vocational credits by 1984, by gender and by race ethnicity

	Any AA degree	Any certificate	Vocational AA	Vocational certificate	Twelve vocational credits
Females					
Race ethnicity[1]					
Asian	22	—	5	—	12
Hispanic	22	2	11	2	13
Black, nonHispanic	10	1	6	1	8
White, nonHispanic	19	3	9	2	9
Males					
Race ethnicity[1]					
Asian	7	—	3	—	16
Hispanic	8	4	3	4	13
Black, nonHispanic	4	1	2	1	18
White, nonHispanic	18	2	9	2	16

[1]The sample size of Native American students was too small for reliable estimates.
—Sample size too small for reliable estimate.

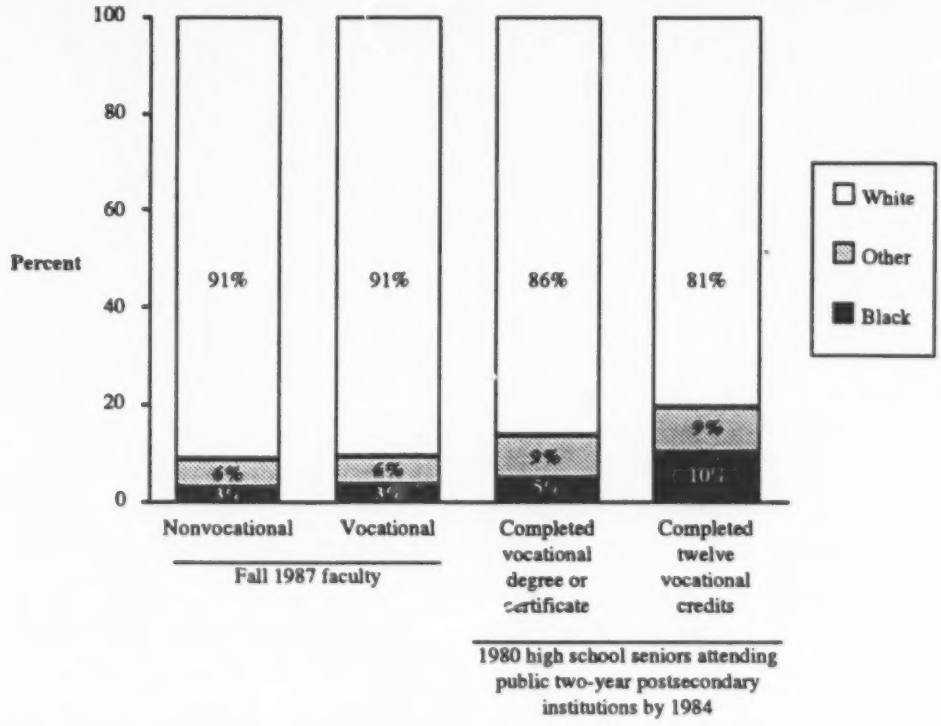
SOURCE: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Postsecondary Vocational Faculty

Like secondary vocational teachers, most (91%) of the 1987-1988 postsecondary faculty were white, and whites were equally represented among both vocational and nonvocational teachers (see Figure 21). Three percent of both vocational and nonvocational faculty were Black. This percentage is lower than the percentage of Black students in the 1980 cohort who obtained degrees or concentrated in vocational education by 1984. Of 1980 high school seniors who enrolled in public two-year postsecondary institutions by 1984 and obtained a vocational degree or certificate, five percent were Black. Of those 1980 seniors who enrolled in public two-year postsecondary institutions by 1984 and left with twelve or more completed units of vocational courses, ten percent were Black. In addition, it is likely that among students who were enrolled in vocational

programs in 1984 but who had not yet left or earned degrees, higher percentages were Black. By 1984, Black students represented five to ten percent or more of vocational students, yet only three percent of vocational faculty were Blacks in 1987-1988. Therefore, since it is not likely that a higher percentage of the faculty were Black in 1984, Blacks were underrepresented among vocational faculty.

Figure 21
Percentage distribution of Fall 1987 nonvocational and vocational faculty in public two-year institutions and 1980 high school seniors who attended public two-year institutions by 1984 and completed a vocational degree, certificate, or twelve vocational credits by 1984



SOURCE: U.S. Department of Education, National Center for Education Statistics, 1988 National Survey of Postsecondary Faculty in Hoachlander et al. (1992), Table 56; and High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.

Summary

In postsecondary vocational education, although Black 1980 high school graduates were just as likely as white graduates to attend public two-year institutions by 1984 (where the bulk of vocational education takes place), they were less likely to take vocational courses. However, these Black and white students from similar SES backgrounds did not differ in vocational participation, and within major vocational programs, Black students were about as likely as white students to take courses in business and office, technical education, data processing, marketing and distribution, and health.

Black and white students did differ in course taking within several of the vocational program areas. Blacks in public two-year institutions were less likely than whites to take courses in the traditional program areas of agriculture, home economics, and trade and industry and the more technical skill area of computer programming. This latter difference may reflect differences between Black and white men, for Black men were less likely than white men to take courses in computer/data processing, computer programming, and other precision production. In contrast, only in protective services were Black women less likely than white women to take courses.

While Black and white students were equally likely to take other business and office courses, Black students earned more credits in this area. In all other vocational programs, Black and white students earned similar numbers of credits. However, several nonsignificant differences are worth noting. It appeared that Black women and Black students from low SES backgrounds completed less coursework in health programs than similar white students. Similarly, along with all Black men, Black students from higher SES levels appeared to take fewer computer/data processing courses.

While Black students in this cohort were less likely to complete vocational associate's degrees, they were just as likely to accumulate twelve or more vocational credits before they left, so they may be somewhat trained. As with secondary vocational teachers, Blacks are underrepresented among postsecondary vocational faculty, especially compared with the percentage of vocational students in this cohort who are Black.

SUMMARY AND CONCLUSION

Background

Secondary and postsecondary vocational education programs offer academic and occupational training that can lead to employment in a variety of traditional, emerging, and high technology occupations. For high school students who want applied and academic preparation for postsecondary education, for those who do not pursue postsecondary education, for those who need to support themselves before or while attending college, or for those who may not complete four years of college, this training can increase the likelihood of success in postsecondary education or employment. Since Black high school graduates have lower postsecondary attendance rates and higher unemployment rates than do white students, vocational education could potentially increase the employment opportunities for young Black Americans. Black educators are concerned that Black students are missing out on these opportunities for training and employment by not participating in vocational education to the same extent as white students. In particular, they are concerned that Black students have not had equal access to high technology vocational programs, which could lead to the jobs with the most potential for growth, income, and advancement.

This report used the latest national data sets to analyze the status of Black Americans in vocational education in the 1980s. Starting with a review of the historical relationship between Black Americans and vocational education, this analysis identified the areas of vocational education where Black Americans have achieved equal representation with whites, where they are still underrepresented, and where more investigation is needed to determine whether Black Americans are being given new opportunities in vocational programs or whether they remain in low-level occupations.

The historical experience that Black Americans have had with vocational education explains much of their current status in and attitudes toward it. From the time vocational education started in the late 1800s until the 1940s, it was used to channel Black students away from the academic curriculum and to limit their training to preparation for the lower-level jobs that were open to them in white society—farming, farm maintenance, and domestic service. By the 1930s and 1940s, more vocational education programs opened to Black students, but the schools and curriculum for Black and white students were still

89

different and unequal. Many Black students began to turn away from vocational education and to pursue academic and professional careers instead.

While educational inequalities between Black and white students and schools were successfully challenged during the 1950s and 1960s, Black and white vocational students in the 1970s still tended to enroll in different types of programs. During that decade, Black students were underrepresented in vocational programs that led to higher-level occupations and overrepresented in those that trained for low-level or dead-end jobs. Nevertheless, Black students who were enrolled in vocational programs in the 1970s felt more positively about vocational education than did Black students who were not participating in vocational programs. For the most part, most Black and white students felt that vocational education offered valuable training, although they might not choose it for themselves. Students who felt negatively about vocational education tended to be those with more opportunities such as those who were white, male, from higher SES backgrounds, or college-bound. In addition, the majority of Black parents did not want their children to be involved in vocational education, and a majority of Black students felt that their parents wanted them to attend college.

These recent inequalities and attitudes can be explained not only by the legacy of the historical and blatant channeling of Black Americans into certain types of vocational education but also by continuing racism and structural biases. These biases may be more subtle, but they may still limit the types of vocational programs in which Black Americans can succeed. While these historical and structural explanations were not the focus of this report, this analysis identified the areas of vocational education where past or current limitations may still be operating and where they are not.

Current Status

Secondary Vocational Education

Black secondary students in the 1980s were just as likely as their white peers to enroll in vocational courses, including courses that provided specific labor market preparation. However, Black students from lower SES backgrounds did not participate in vocational education courses to the same extent as did white students from similar backgrounds. Although Black and white students participated equally within most

vocational programs, between 1982 and 1987, Black students fell behind white students in their participation in technical and communication programs. By 1987, both Black men and women took fewer technical and communication courses than did white men and women. In addition, Black men took fewer trade and industry courses, specifically in precision production as compared with white men.

These results provide evidence that Black Americans from the lowest SES backgrounds are not obtaining as much vocational training as similar white students. More research needs to be conducted to determine whether these Black students are less likely to take vocational courses because they do not perceive vocational education as necessary or useful, whether they are being discouraged from participating, or whether they do not participate for some other reason. Information on the outcomes of vocational education for white students from low SES backgrounds and for other Black students would identify how vocational education can increase the academic or occupational achievement of low SES Black students. Only then can appropriate strategies to increase their participation be devised.

In addition, more information needs to be obtained about why Black secondary students were participating at much lower levels than their white counterparts in the high-skilled and high-level technical and communication programs and why Black men took fewer courses than white men in precision production programs. It is not known whether these lower participation rates were due to less academic preparation, less interest in the programs, or less access to these programs. This information could help identify the best strategies for increasing their participation.

Vocational course taking did not appear to affect the postsecondary attendance of Black high school graduates. In fact, Black high school graduates were less likely than white graduates to attend postsecondary institutions if they took little or no vocational education courses. However, among high school graduates who took two or more vocational courses, Black students were just as likely as whites to attend a postsecondary institution by 1984, regardless of how many vocational courses they took. Therefore, participating in vocational programs did not discourage Black students from pursuing further education. However, among those students who took eight or more yearlong vocational courses and did not pursue postsecondary education, Black students had much higher unemployment rates than similar white students. Thus, in this cohort, vocational

education was not able to equalize the employment rates of Black and white high school graduates when students did not pursue postsecondary education. More research is needed to determine whether particular vocational programs could make a difference in employment rates for these students.

Finally, Black high school vocational students were not taught by comparable numbers of Black vocational faculty. Increasing the percentage of vocational teachers who are Black Americans would provide needed role models and advisors for Black vocational students. Further, these Black teachers might be able to encourage Black students from low-SES backgrounds to participate in vocational education and motivate more Black students from all backgrounds to take vocational courses in the technical and communication fields.

Postsecondary Vocational Education

Most 1980 high school seniors attending postsecondary institutions that offered vocational programs were enrolled in public two-year colleges, and Black seniors were just as likely as white seniors to attend these institutions. However, Black students in this cohort who enrolled in public two-year colleges by 1984 were less likely to take vocational courses than their white counterparts. Most Black and white students took academic courses, so the difference in vocational course taking may indicate that more Black than white students in this cohort pursued exclusively academic degrees. Within most vocational programs and among students from similar SES backgrounds, Black and white students were equally as likely to take vocational courses.

Black and white students differed in their intensity of course taking in agriculture, home economics, trade and industry, and computer programming, where Blacks were less likely than whites to take courses. To the extent that these programs lead to employment, more information is needed about why Black students were not taking these courses. In computer programming, Black and white men differed in their course-taking patterns, but Black and white women did not. As a growing field with many opportunities for advancement, this is an occupational area that both Black men and women could be encouraged to pursue. There were some indications that Black students from higher SES backgrounds were also less likely than similar white students to take computer programming courses. This difference may not be necessarily negative, however, because these Black students may be pursuing academic careers. Nonetheless, more information is

necessary to confirm that Black students were choosing not to take computer courses rather than being discouraged from taking them.

Black women lagged behind white women in vocational participation only in protective services, a difference which may reflect a legacy of gender and race exclusion in this field. However, given the opportunities and advancement potential in protective services, Black women could be encouraged and supported to pursue careers in this area. There were also some indications that Black women and Black students from low-SES backgrounds were less likely than comparable white students to take courses in health programs. Because health programs often provide technical skills and knowledge that lead to careers with good employment and advancement potential, Black students should be encouraged to pursue these courses as well.

Black 1980 high school seniors enrolled in public two-year colleges were less likely than whites in the same cohort to complete a vocational associate's degree, or any associate's degree, by 1984. However, this difference is not necessarily negative and several explanations are possible. Black students may have had more financial constraints than white students that could have lengthened their degree program, or they may have been enrolled in transfer rather than in degree programs. Among students in this cohort who left two-year colleges by 1984 without completing a degree, Black students were just as likely as white students to have earned twelve or more vocational credits. It is not known how these students used these credits because many of these students probably transferred to four-year institutions. However, for those who used the credits or the associate's degrees for employment purposes, earning a minimum number of vocational credits may have been just as important as a vocational degree.

Like Black secondary vocational teachers, Black vocational instructors were underrepresented among postsecondary vocational faculty given the numbers of Black students in vocational programs. Increasing Black representation among postsecondary vocational faculty might lead to higher participation in vocational programs among Black students. In addition, Black vocational faculty might be more successful in encouraging Black students to obtain vocational and other associate's degrees and/or to pursue the more lucrative fields.

Conclusion

By the 1980s, although Black Americans had achieved almost equal footing with whites in secondary and postsecondary vocational education, there were still some areas in which Black students were missing out on the opportunities offered by vocational programs. At the secondary level, most Black students were participating in vocational education to the same extent as white students. In addition, Black high school students who took vocational courses tended to pursue postsecondary education regardless of the amount of vocational education they took. However, more information is needed to determine the best strategies for increasing the participation of Black students from low-SES backgrounds in vocational education and for increasing the participation of all Black students in technical and communication programs.

At the postsecondary level, Black students were just as likely as white students to be attending public two-year institutions, but they were less likely to be taking vocational courses or to be completing vocational or other associate's degrees. Since Black students who were not participating in vocational programs may have been pursuing academic transfer programs, it was not clear that these differences in vocational education were negative. Black students who left college without a degree or certificate took similar numbers of vocational courses as did white noncompleters; therefore, those who needed vocational training for employment may have been receiving it. However, more information is necessary to determine why Black students were less likely than white students to take courses in agriculture, home economics, trade and industry, and computer programming; and why Black women were less likely than white women to take courses in protective services. Finally, in both secondary and postsecondary vocational education, more Black teachers and faculty are needed to provide role models and encouragement for the large numbers of Black students enrolled in vocational education.

REFERENCES

Anderson, J. D. (1982). The historical development of black vocational education. In H. Kantor & D. B. Tyack (Eds.), *Work, youth, and schooling*. Stanford, CA: Stanford University Press.

Bell, A. P., Powers, L., & Rogers, I. C. (1987). Commitment of 1890 land grant institutions to teacher education in agriculture. *The Agricultural Education Magazine, 60*(6), 13-14.

Bowen, B. E. (1987). A minority perspective on minorities in agriculture. *The Agricultural Education Magazine, 60*(6), 3-4.

Brown v. Board of Education, 347 U.S. 483 (1954); 349 U.S. 294 (1955).

Choy, S., & Horn, L. (in press). *A guide to using postsecondary transcript data and an overview of course taking in less-than-4-year postsecondary institutions.* Berkeley: National Center for Research in Vocational Education, University of California at Berkeley.

Cremin, L. A. (1988). *American education: The metropolitan experience 1876-1980.* New York, NY: Harper & Row.

Cremin, L. A. (1961). *The transformation of the school: Progressivism in American education, 1876-1957.* New York, NY: Vintage.

Du Bois, W. E. B. (1903). *The souls of Black folk* (rev. ed.). New York, NY: Bantam.

Dunn, O. J. (1961, March) Multiple comparisons among means. *Journal of the American Statistical Association, 56*, 52-64.

Franklin, J. H. (1966). *From slavery to freedom: A history of American Negroes* (2nd ed.). New York, NY: Alfred A. Knopf.

Gifford, A. G., Hoachlander, E. G., & Tuma, J. E. (1989). *The secondary school taxonomy* (Report prepared for the National Assessment of Vocational Education, Office of Planning, Budget, and Evaluation, U.S. Department of Education). Berkeley, CA: MPR Associates.

Heintze, M. R. (1985). *Private Black colleges in Texas, 1865-1954.* College Station, TX: A&M University Press.

Hoachlander, E. G. (forthcoming). *Participation in secondary vocational education, 1982-1987.* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Hoachlander, E. G., Kaufman, P., & Levesque, K. (1992). *Vocational education in the United States, 1969-1990* (Report prepared for the U.S. Department of Education, National Center for Education Statistics). Washington, DC: U.S. Government Printing Office.

Ihle, E. (1986). *Black women's vocational education: History of Black women's vocational education in the South, 1865-present. Instructional modules for educators, Module II* (Module prepared for the Women's Educational Equity Act Program, U.S. Department of Education). Harrisonburg, VA: James Madison University.

Jaynes, G. D., & Williams, R. M., Jr. (Eds.). (1989). *A common destiny: Blacks and American society.* Washington, DC: National Academy Press.

Kaufman, P. (forthcoming). *A comparison of vocational and nonvocational teachers in grades 9 through 12.* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

King, J., Jr. (1977). The perceptions of Black high school students toward vocational and technical education programs. *Journal of Negro Education, 46*(4), 430-442.

Klockars, A. J., & Sax, G. (1986). *Multiple comparisons.* Newbury Park, CA: Sage.

Larke, A., Jr., & Barr, T. P. (1987). Promoting minority involvement in agriculture. *The Agricultural Education Magazine, 60*(6), 6-7.

Lazerson, M., & Grubb, W. N. (1974). *American education and vocationalism: A documentary history, 1870-1970.* New York, NY: Teachers College Press.

Miller, B., & Royal, G. (1989). Combating "unconscious discrimination" in Oklahoma's vo-tech system. *Vocational Education Journal, 64*(3), 16-18.

Mokros, J. (1984). Hidden inequities can be overcome. *VOCED, 59*(4), 39-41.

Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science* (National Science Foundation Report R-3928-NSF). Santa Monica, CA: RAND.

Oakes, J. (1985). *Keeping track: How schools structure inequality.* New Haven, CT: Yale University Press.

Ogbu, J. (1988). Class stratification, racial stratification, and schooling. In L. Weiss (Ed.), *Race, class, and gender in American education* (pp. 163-182). Albany: State University of New York Press.

Ogbu, J. (1978). *Minority education and caste: The American system in cross-cultural perspective.* New York, NY: Academic Press.

Plessy v. Ferguson, 163 U.S. 537 (1896).

Ploski, H. A., & Williams, J. (Eds.). (1989). *The negro almanac: A reference work on the African American.* Detroit, MI: Gale Research.

Rossetti, R. (1989a, March). *Reasons high school students are not enrolling in vocational education and people influencing students' decisions.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Rossetti, R. (1989b, December). *Student and parent images of vocational education offerings: Declining enrollment in vocational education.* Paper presented at the Annual Convention of the American Vocational Association, Orlando, FL.

Rumberger, R. W. (1986). *The changing industrial structure of the U.S. economy: Its impact on employment, earnings, and the educational requirements of jobs.* Unpublished paper, Stanford Education Policy Institute, School of Education, Stanford University.

Sheppard, N. A. (1983, April). *Cultural factors affecting the participation of Blacks in vocational education.* Paper presented at the sixty-seventh annual meeting of the American Educational Research Association, Montreal, Canada.

Silvestri, G. T., & Lukasiewicz, J. M. (1987). A look at occupational employment trends to the year 2000. *Monthly Labor Review, 112*(11), 46-63.

Straquadine, G. (1987). Black farmers in America. *The Agricultural Education Magazine, 60*(6), 5-6.

Taylor, W. N., Powers, L., & Johnson, D. M. (1990). The 1890 institutions at 100. *The Agricultural Education Magazine, 63*(2), 8-9.

Title IX of the Education Amendments of 1972. 20 U.S.C. 1681 (1972).

Vos, R., Tesolowski, D. G., & Hux, T. R. (1982, November). *Adolescents' attitudes toward vocational education.* Paper presented at the annual meeting of the Mid-South Educational Research Association, New Orleans, LA.

Washington, B. T. (1901). *Up from slavery* (rev. ed.). New York, NY: Viking Penguin.

West, J. (1989). *The postsecondary vocational education of 1980 high school seniors: The two-year associate of arts degree* (Survey Report CS 89-610 for the U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics). Washington, DC: U.S. Government Printing Office.

West, R. F., & Shearon, R. W. (1982). Differences between Black and white students in curriculum program status. *Community/Junior College Quarterly, 6*(3), 239-251.

William T. Grant Foundation Commission on Work, Family, and Citizenship. (1988). *The forgotten half: Pathways to success for America's youth and young families. Final report.* Washington, DC: Author.

Young, W. C. (1989). Too few Black Americans in vocational education. *Vocational Education Journal, 64*(3), 12-14.

99

APPENDIX A

TECHNICAL NOTES

APPENDIX A: TECHNICAL NOTES

Data Sources

The analyses were based on the latest available national data sets that provided information on vocational education participation. These data sets included the following:

- *The 1987 High School Transcript Study* of the *National Assessment of Educational Progress (NAEP)*;
- *The High School & Beyond (HS&B) Survey*;
- *The 1986-1987 Schools and Staffing Survey (SASS)*; and
- *The 1987-1988 National Survey of Postsecondary Faculty (NSOPF).*

Secondary Data

The latest national data available for secondary vocational education participation are national samples of the 1982 high school seniors and the 1987 high school seniors. These data sets are both from the Department of Education, National Center for Education Statistics. The *1987 High School Transcript Study* of NAEP contains detailed information on the vocational and academic courses taken in high school by the 1987 seniors who were eleventh graders in 1986. In addition, it provides data on the seniors' race ethnicity and gender. However, the 1987 NAEP does not include socioeconomic status (SES) data, which is a major variable of interest. Therefore, data from 1982 seniors was used to examine differences between Blacks and whites within SES levels as well as to compare changes between 1982 and 1987.

The 1982 seniors are a subsample of 1980 sophomores whose high school transcripts were collected as part of the HS&B Survey. Only public school high school graduates are found in this subsample. The data set includes information on the high school courses taken, as well as race ethnicity, gender, and SES. In addition, the vocational courses taken are categorized by level of advancement in the subject: first level, second level, or specialty level.

Information on the 1987-1988 secondary vocational faculty comes from the 1986-1987 SASS. This survey collected data on elementary and secondary teachers who were

teaching during the 1987-1988 school year. Only public school teachers were used in this analysis. Vocational teachers were defined as those who taught half or more of their courses in vocational subjects.

Postsecondary Data

The latest data available for postsecondary vocational education participation and coursework are for 1980 high school seniors who attended postsecondary institutions by 1984. Data is provided on these students through 1984. This information is from the HS&B Senior Cohort and includes data on their postsecondary attendance patterns and course taking through 1984, as well as their race ethnicity, gender, and SES.

Although postsecondary course-taking information was available for the HS&B 1982 seniors (1980 sophomores), transcripts were only collected for those who went directly to postsecondary education (PSE) after high school graduation, and this restriction resulted in too limited a sample for this analysis. The sample of 1980 seniors includes all those who started PSE at any time up until 1984.

Data on postsecondary vocational education faculty are available for the 1987-1988 academic year from the NSOPF. This data set consists of a sample of faculty members from a selection of nonproprietary U.S. postsecondary institutions that grant a two-year or higher degree and that are accredited by the U.S. Department of Education.

Vocational Education Organization and Curriculum

Vocational education is defined by the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 as "programs that prepare students for paid or unpaid employment requiring other than a baccalaureate or advanced degree" (Hoachlander, Kaufman, & Levesque, 1992). This appendix describes, separately for the secondary and postsecondary levels, how vocational education is organized in the United States, how vocational education fits into the overall curriculum, and how vocational courses are grouped into major vocational program areas.

Secondary Vocational Education

Vocational education at the secondary level is provided by several different types of institutions. Comprehensive high schools have an academic focus but include vocational programs on the same campus. Full-time vocational schools also include both vocational and academic programs, but they teach academic subjects in the context of vocational studies. In addition, some communities use area vocational schools which provide vocational training on a separate campus. Students travel to this campus for part of the day from high schools throughout the local area and return to their home schools for academic studies.

For students in each type of high school, the secondary curriculum consists of three major types of courses: (1) academic, (2) personal/other, and (3) vocational. The academic course subjects are mathematics, science, English, social studies, fine arts, and foreign languages. Personal/other courses cover the topics of physical education, personal health, driver education, religion, philosophy, and military science.

Vocational courses are divided into three areas[9]: (1) consumer and homemaking education, (2) general labor market preparation, and (3) specific labor market preparation. Consumer and homemaking education consists of courses intended to prepare students for roles outside the paid labor market such as child care, sewing and clothing care, basic food preparation, and household management. General labor market preparation courses provide skills that can be used in the labor market as well as in personal life and do not apply to specific occupations such as beginning typing, introductory industrial arts, work experience/career exploration, business math, and business English.

Specific labor market preparation (SLMP) is the area of the vocational curriculum that prepares students for specific occupations. SLMP courses are grouped within seven occupational program areas: (1) agriculture and renewable resources, (2) business, (3) marketing and distribution, (4) health, (5) occupational home economics, (6) trade and industry, and (7) technical and communications. These courses are also divided into the following levels: first level (introductory), second level (advanced), and specialty (electives).

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[9]The course taxonomy developed in Gifford, Hoachlander, and Tuma (1989) is used here.

The seven program areas among SLMP courses include the following courses[10]:

1. *Agriculture* includes courses that prepare students for employment in farming, horticulture, landscaping, animal care, forestry, park management, and natural resources management. Natural resources courses teach skills in conservation and regulation, wildlife management, and forest maintenance and logging.

2. *Business* offers training in business management and business support. Business management includes courses in finance, investments, hotel and motel management, personnel, and other aspects of management. Business support includes courses in bookkeeping, accounting, data processing, computer operations, advanced typing, word processing, secretarial skills, and specialty clerical skills such as medical records, court reporter, and bank teller. Also included are courses in library sciences and security services.

3. *Marketing and distribution* includes courses related to the selling and distribution of goods and services, teaching skills in sales and marketing of small businesses, marketing and marketing research in many service and products industries, starting small businesses, fashion design, and advertising.

4. *Health* includes courses intended to prepare students for careers in the health field such as nursing, dental, and chiropractic assistants, mental health workers, lab and pharmacy technicians, and ambulance operators.

5. *Occupational home economics* includes courses intended to prepare students for employment in the service sector such as cosmetology and barbering, child care, fashion design and sewing, food service, home decorating, and custodial services.

6. *Trade and industrial* courses are divided into the construction trades, mechanics and repairers, precision production, and transportation. Courses in the *construction trades* prepare students in electricity, carpentry, masonry, plumbing, and other skills related to housing construction. *Mechanics and repairers* courses teach skills in repairing home appliances such as radios, televisions, and refrigerators and maintaining and repairing various types of industrial equipment such as heating and air conditioning systems and heavy machinery. In addition, auto mechanics and

[10]These descriptions are based, in part, on those in Hoachlander et al. (1992).

body repair, small engine repair, and petroleum drilling equipment operation are also included in this group. *Precision production* courses teach students how to design and create goods. The skill areas range from the white-collar occupations of architecture, photography, electronics design, drafting, and graphics to the more blue-collar occupations of printing, metalwork, welding, woodworking, leatherwork, and upholstery. *Transportation and material moving* courses teach skills in aeronautics and aviation technology, as well as truck and bus driving, forklift operating, and marine occupations.

7. Finally, *technical and communication* courses teach skills in television, broadcasting, filmmaking, and radio. Also included are data processing systems and computer programming and applications, civil engineering and surveying, and the technology of a wide range of scientific industries.

Postsecondary Vocational Education

Most vocational education at the postsecondary level is provided by less-than-four-year institutions that offer programs leading to prebaccalaureate degrees, usually associate's degrees for programs lasting two years, or certificates for programs shorter than two years. While four-year institutions offer vocational courses, these courses cannot be easily distinguished from academic courses, so only less-than-four-year institutions are examined in this report. These institutions consist of four types: (1) public two-year, (2) public vocational-technical institutes, (3) private proprietary schools, and (4) private less-than-four-year. Public two-year institutions consist primarily of publicly subsidized local junior or community colleges that offer two-year programs. Public vocational-technical institutes provide shorter programs and do not award associate's degrees. Private proprietary schools are not publicly subsidized and offer a range of vocational programs, from six-week certificate programs in truck driving to two-year associate's degree programs in business, computer programming, health careers, or other subjects (Hoachlander et al., 1992).

Programs in these less-than-four-year institutions are categorized as either academic or vocational.[11] Academic programs include courses in the areas of mathematics and science; letters, humanities, and communications; social sciences; art and design; education; and other. Vocational programs are divided into the seven areas of (1) agriculture,

[11]The course taxonomy developed in Choy and Horn (in press) is used here.

(2) business and office, (3) marketing and distribution, (4) health, (5) home economics, (6) technical education, and (7) trade and industry. These seven vocational areas correspond to the seven categories of SLMP courses in secondary institutions so that, theoretically, students at the postsecondary level can continue studies begun at the secondary level.

The seven postsecondary vocational program areas are more advanced than those at the secondary level and include the following courses:

1. *Agriculture* includes courses in agricultural business and management for the production of animal and plant products, which cover such issues as economics and finances, agricultural mechanization, the management of production workers, and food processing; horticulture, which includes landscaping and nursery and greenhouse operations; agricultural sciences, which covers scientific issues related to plants, animals, and soil; and conservation and renewable natural resources, which teaches environmental protection, natural resource management and production such as logging and paper production, and wildlife and wildlands management and protection.

2. *Business and Office* includes courses in accounting; business and management; secretarial services such as administrative assistant, court reporter, receptionist, data entry, and clerical and typing; and other business issues such as financial management, human resource management, international business, information and data processing services, computer programming and systems analysis, and computer facilities operation.

3. *Marketing and distribution* includes courses in the promotion and distribution of a variety of goods and services such as apparel and accessories, business and personal services, food products, home and office products, hospitality and recreation, insurance, vehicle and petroleum products, and health products. It also includes marketing for beginning businesses and courses in general retail and wholesale selling operations.

4. *Health* includes courses in nursing, health sciences, and allied health. Nursing includes training as registered nurses, practical nurses, and nurse's aides. Health sciences include instruction in all the sciences that support the practice of medicine such as biology, immunology, nutrition, and pathology. Allied health includes the

many other health technician occupations such as dental assistant, medical records clerk, medical laboratory assistant, assistant to other health practitioners, diagnostic and monitoring technician, using equipment such as X-rays and heart-lung machines, rehabilitation and therapy technician, pharmacy assistant, and ophthalmic assistant.

5. *Home economics* is divided into home economics and vocational home economics. Home economics offers theories of families and family resources such as family resource management, nutrition studies, housing environments, individual and family development, and clothing and textiles studies. Vocational home economics includes courses that prepare students for paid or unpaid employment in services related to the home such as child care; clothing design, construction, repair, and cleaning; food preparation, serving, and catering; home furnishing; and custodial and housekeeping services.

6. *Technical education* includes courses in computers and data processing, engineering and science technologies, protective services, and communication technology. *Computers and data processing* courses are divided into computer programming, which involves developing programs for the computer; data processing, which involves using computer programs to do routine tasks; and other computer and information science courses. *Engineering and science* courses are divided into engineering and engineering technologies courses and science technologies courses. Engineering and engineering technologies courses lead to jobs as engineering technicians in a wide variety of engineering fields, including civil, electronics, and architectural engineering, and in a variety of technical areas such as computer maintenance; heating, air conditioning, and refrigeration; environmental protection technology; and occupational safety and health. Science technologies courses teach scientific principles and skills for use in support jobs in scientific research and development such as biological lab technicians and nuclear power plant technicians. *Protective services* include courses in criminal justice and fire protection. *Communication technologies* include courses in educational media, photographic technology, and radio and television broadcasting.

7. *Trade and industry* includes courses in construction; automotive mechanics and repairers; other mechanics and repairers; drafting; precision metal; other precision production; transportation and materials moving; and consumer, personal, and

miscellaneous services. *Construction* includes all the trades related to building and maintaining structures. *Automotive* includes mechanics and repairers of automobile engines and bodies, diesel and small engines, bicycles, motorcycles, and aircraft. *Other mechanics and repairers* include repairers of electrical and electronics equipment, heating, air conditioning, and refrigeration; industrial equipment; and miscellaneous mechanics such as locksmith and musical instrument, watch, clock, and jewelry repairers. *Drafting* courses include architectural, civil, electrical, and mechanical drafting. *Precision metal* courses lead to occupations such as machinist, machine shop assistant, sheet metal worker, welder, and tool and die maker. *Other precision production* courses lead to occupations such as woodworker, leatherworker, and upholsterer, and graphic and printing equipment operators. *Transportation and materials moving* courses prepare for occupations as workers in the air travel industry; construction equipment operators; truck, bus, and other vehicle operators; and occupations on water (fishing) or in water (diving). Finally, *consumer, personal, and miscellaneous services* include games and sports officials, funeral services, hair and cosmetic services, massage, and food and kitchen services.

Measures of Status: Participation and Outcomes

This report examines the status of Black Americans as students and as instructors in secondary and postsecondary vocational education. The status of Black Americans is examined by comparing the participation of Blacks in vocational education with that of whites. For both secondary and postsecondary levels, participation by students is measured by the percentage of students who took vocational courses overall and within programs and, of those who took courses, the average number of credits they earned.

At the secondary level, these participation measures are straightforward. For the high school classes of 1982 and 1987, the percentage of students refers to the number of students in the high school class who took vocational courses overall or within a particular program as a proportion of the number of all students in that class with the particular characteristic of interest such as SES level or gender. Thus, for secondary students, the base of students consists of all seniors in secondary school in that year with the particular characteristic of interest. Average number of credits are calculated using only those

students in that group who actually took the courses, either overall or in a particular program.

While secondary participation measures are straightforward, outcome measures are not. The best information about student outcomes of secondary vocational education and student participation in postsecondary vocational education comes from the longitudinal HS&B surveys that follow seniors from particular high school classes, in this case, the classes of 1980 and 1982, from senior year into subsequent jobs and/or education. It is important to keep in mind that for these measures, the information presented is only true for that particular class, or cohort, of students. While this might seem obvious when discussing the percentages of the students in these cohorts who took vocational courses in secondary school, when we move to the outcomes of secondary vocational education or to the percentage attending postsecondary institutions and the percentage in postsecondary institutions taking vocational courses, this perspective is more complex.

For instance, the discussion of the outcomes of secondary vocational education pertains only to the students in the high school class of 1982. The outcomes measured were the percentage of students pursuing postsecondary education and the percentage who are working. For students who took various numbers of vocational credits in secondary school, the percentage who attended any PSE institution and each type of PSE institution within two years of graduation is presented. In addition, among students in the cohort who took eight or more secondary vocational units, the percentage who were working full-time, part-time, or who were unemployed within six months of graduation is presented, both for those who were and were not attending PSE. In the case of these outcomes, we are not talking about all the high school graduates who could be attending postsecondary institutions or working at that time. Instead, we are only referring to students in a particular high school class, or cohort, who were attending institutions or working by a certain date. Therefore, inferences about the percentages of high school graduates attending postsecondary institutions or working pertain only to students in that high school class in that time period.

Similarly, when discussing the vocational education participation of students in postsecondary institutions, we are only referring to students from that cohort who were attending postsecondary institutions by a certain date and, of those students, the percentages who took vocational courses. We are not referring to all students who are

attending those institutions at that time. Instead, the percentage of students refers to the number of students in the cohort who took vocational courses overall or within a particular program as a proportion of the number of students who were in that cohort, in the type of institution indicated, with the particular characteristic of interest. As for secondary students, the average number of credits are then calculated using only those students in this group who actually took the courses either overall or in a particular program.

The postsecondary vocational outcome measures are the completion rates for postsecondary students in this cohort. That is, of the students in this cohort who attended postsecondary institutions by 1984, the percentage who completed a variety of degrees and units by 1984 are examined. Completion rates of this cohort are examined for completing any AA/AS degrees, vocational AA/AS degrees, certificates, and vocational certificates, and for leaving with twelve vocational credits.

For secondary and postsecondary vocational teachers and faculty, the participation measures are more straightforward. The teaching and faculty data sets are cross-sectional, and, thus, capture the characteristics of all teachers at one point in time. Therefore, the percentage of 1987 secondary vocational teachers and of 1988 postsecondary faculty who are Black are presented. For comparison, the race ethnicity distribution of the most comparable available student cohort who are taking vocational courses is also presented.

Statistical Methodology

Accuracy of Estimates

The statistics in this analysis are estimates derived from samples. Two broad categories of error occur in such estimates: sampling and nonsampling error. Sampling errors happen because observations are made only on samples of students, not on entire populations. Nonsampling errors occur not only in surveys of sample groups but also in complete censuses of entire populations.

Nonsampling errors can be caused by a number of factors: inability to obtain complete information about all students in all schools in the sample (some students or schools refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to

give correct information; mistakes in recording or coding data; and other errors in collecting, processing, sampling, and estimating missing data.

The accuracy of survey results is determined by the effect of sampling and nonsampling errors. In surveys with sample sizes as large as those used in this report, the sampling errors generally are not the primary concern except where separate estimates are made for relatively small subpopulations such as high SES Blacks or Native Americans. In this report, small sample sizes were sometimes a problem when estimating differences between Blacks and whites within SES levels or vocational programs, and some of those estimates could not be calculated.

Statistical Procedures

The descriptive comparisons in this report were based on *Student's t* statistics. Comparisons based on the tables include the estimates of the probability of a Type I error, or significance level. The significance levels were determined by calculating the *Student's t* values for the differences between each pair of means, or proportions, and by comparing these with published tables of significance levels for two-tailed hypothesis testing.

The NAEP, HS&B, SASS, NSOPF and samples, while representative and statistically accurate, are not simple random samples. Students or teachers were initially selected within high schools grouped within strata. Sampling rates for institutions within different strata varied, resulting in better data for policy purposes but at a cost to statistical efficiency. Hence, simple random techniques for estimating standard errors frequently underestimate the true standard errors for some estimates. To overcome this problem, standard errors for all estimates in this report were calculated using either replication procedures or Taylor residual techniques.

To compare estimates for separate subgroups or to understand the quality of the estimates, standard errors are needed. This report presents many estimates, and each estimate has an associated standard error. The standard errors vary in size as a function of sample size and sample design. Hence, the standard errors of the estimates for some small groups (e.g., Asian students, students in vocational-technical institutes) may be so large that the estimates should not be used. While the estimates based on twenty-nine or fewer cases were suppressed, the computer automatically produced estimates for subgroups with

thirty or more cases. However, the associated standard errors must be used to adjust particular estimates.

Student's t values were computed for comparisons using these tables' estimates with the following formula:

$$t = P_1 - P_2 / \text{SQRT}\,(se_1^2 + se_2^2)$$

where P_1 and P_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors.

There are hazards in using statistical tests for each comparison. First, comparisons with large *t* statistics may appear to merit special attention. This can be misleading because the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of students in the specific categories used for comparison. Hence, a small difference compared across a large number of students would produce a large *t* statistic.

A second hazard in using statistical tests for each comparison is that, when making multiple comparisons among categories of an independent variable (e.g., different race ethnicity groups), the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics, or "families," are tested for statistical significance, we must apply a standard that assures a level of significance for all of those comparisons taken together.

In order to reduce the probability of Type I error in a set of multiple comparisons, the Bonferroni was used for families of *Student's t* tests. Families of tests were defined as pairwise tests comparing an outcome for two or more related categories of students. For example, a comparison of the average number of Carnegie units earned in vocational education among Native American, Asian, Hispanic, Black, and white postsecondary students makes up a family of tests with ten comparisons possible: white vs. Black, white vs. Asian, white vs. Hispanic, white vs. Native American, Black vs. Asian, Black vs. Hispanic, Black vs. Native American, Asian vs. Native American, and Hispanic vs. Native American.

The critical value for a Bonferroni *t* test depends upon the number of comparisons actually made within a family. When only one pairwise comparison is possible, the Bonferroni interval is the same as the confidence interval obtained from a *Student's t* test. The more comparisons that are possible, the larger the Bonferroni critical value and the greater the *t* statistic needed for each difference to guarantee a significance level of $p \leq .05$ for all of the comparisons taken together.[12]

Differences were considered statistically significant in this report only when $p \leq .05/k$ for a particular pairwise comparison, where that comparison was one of k tests within a family. This guarantees both that the individual comparison would have $p \leq .05$ and that when k comparisons were made within a family of possible tests the significance level of the comparisons would sum to $p \leq .05$.[13] For example, in a comparison of the Carnegie units earned among different racial and ethnic groups, ten comparisons are possible. In this family, $k = 10$, and the significance level of each test must be $p \leq .05/10$ or .005.

Therefore, while many of the participation rates and credit averages reported in the tables and figures may appear to differ between different groups, they are not statistically significant. This is often due to the large standard errors around the estimates for Black Americans and other minorities. However, when a difference would have been statistically significant if only one *t* test had been made and it is part of a trend consisting of other significant results, then it may be mentioned as a result that appears to be different but is not statistically significant.

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12 For a discussion of familywise error rates, see Klockars and Sax (1986), p. 17.

13 The standard that $p \leq .05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p \leq .05$. For tables showing the *t* statistic required to ensure that $p \leq .05/k$ for a particular family size and degrees of freedom, see Dunn (1961).

APPENDIX B

DETAILED TABLES

Table B–1
Percentage of 1987 and 1982 public high school seniors completing one or more courses in vocational education, by type of vocational education and by race ethnicity, gender, and socioeconomic status

	Any vocational education	Consumer and homemaking education	General labor market preparation	Specific labor market preparation
1987 high school seniors				
Total	97.8	47.1	78.5	88.5
Race ethnicity				
Native American	98.4	51.1	78.0	92.2
Asian	93.6	36.6	69.7	82.8
Hispanic	97.8	51.2	76.5	89.1
Black, nonHispanic	98.7	53.6	77.7	88.3
White, nonHispanic	97.8	46.2	79.4	88.2
1982 high school seniors				
Total	97.7	49.9	78.6	86.7
Race ethnicity				
Native American	99.4	50.6	84.8	93.5
Asian	96.0	35.0	78.2	77.9
Hispanic	99.0	55.9	76.9	89.6
Black, nonHispanic	99.2	60.4	76.1	87.0
White, nonHispanic	97.2	47.6	79.2	86.2
Gender				
Male				
Native American	99.0	36.9	81.4	92.0
Asian	96.6	26.7	75.3	82.1
Hispanic	98.6	40.8	68.9	91.0
Black, nonHispanic	98.8	41.5	70.8	88.0
White, nonHispanic	97.1	31.5	71.6	89.5
Female				
Native American	100.0	75.0	90.7	96.3
Asian	95.4	45.1	81.7	72.6
Hispanic	99.5	73.8	86.4	88.0
Black, nonHispanic	99.5	74.8	80.1	86.3
White, nonHispanic	97.3	62.3	86.1	83.1

Table B–1 (cont.)

	Any vocational education	Consumer and homemaking education	General labor market preparation	Specific labor market preparation
Socioeconomic status				
Lowest quartile				
Native American	100.0	45.0	77.8	93.7
Asian	97.0	33.2	74.5	88.4
Hispanic	99.4	58.0	77.8	91.0
Black, nonHispanic	99.9	66.9	79.4	86.6
White, nonHispanic	99.4	58.0	77.4	93.1
Second quartile				
Native American	—	—	—	—
Asian	98.6	41.0	84.8	72.6
Hispanic	99.1	56.2	77.2	92.8
Black, nonHispanic	98.8	59.7	73.0	89.3
White, nonHispanic	98.3	52.1	82.6	90.0
Third quartile				
Native American	100.0	47.7	87.5	94.1
Asian	93.1	31.9	71.7	81.4
Hispanic	98.4	55.7	74.5	88.0
Black, nonHispanic	98.3	45.4	71.5	82.8
White, nonHispanic	97.2	47.8	79.9	86.3
Highest quartile				
Native American	—	—	—	—
Asian	95.3	31.2	78.0	74.6
Hispanic	98.2	46.2	77.9	79.5
Black, nonHispanic	97.3	46.0	74.1	87.6
White, nonHispanic	94.7	36.2	77.0	77.7

SOURCE: Hoachlander (forthcoming), p. 8, and unpublished tabulations, from the U.S. Department of Education, National Center for Education Statistics, and 1987 High School Transcript Study, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Table B–2a

Percentage of 1982 public high school seniors completing one or more courses in specific labor market preparation, by vocational program and by race ethnicity

	Agriculture	Business	Marketing and distribution	Health	Occupational home economics	Trade and industry					Technical and communications
						Total	Construction	Mechanics and repairers	Precision production	Transportation	
Total	9.9	52.9	9.1	4.5	11.5	39.6	7.3	12.9	33.2	0.5	12.9
Race ethnicity											
Native American	15.0	41.2	7.8	5.5	8.7	58.9	7.8	32.8	52.6	0.0	6.0
Asian	4.3	37.3	3.1	5.0	4.8	45.0	3.8	12.4	37.2	1.5	15.2
Hispanic	11.4	53.4	8.4	4.9	12.1	44.8	8.5	14.9	37.9	0.5	8.3
Black, nonHispanic	7.2	52.6	12.0	7.2	13.4	36.0	7.7	8.0	28.2	0.6	11.0
White, nonHispanic	10.2	53.6	8.9	4.0	11.3	38.6	7.1	13.0	32.5	0.4	14.1

NOTE: Estimates may sum to greater than 100% because students may have earned Carnegie units in more than one vocational program area.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Table B–2b

Percentage of 1987 public high school graduates completing one or more courses in specific labor market preparation programs, by race ethnicity

	Agriculture	Business	Marketing and distribution	Health	Occupational home economics	Trade and industry				Technical and communications
						Total	Construction	Precision production	Other	
Total	8.0	53.8	8.7	4.9	10.6	37.5	5.0	32.4	10.9	24.7
Race ethnicity										
Native American	10.5	64.7	4.0	7.7	7.2	50.9	11.8	44.7	10.8	20.2
Asian	0.4	46.1	8.1	9.5	4.5	30.7	0.8	24.8	9.2	29.8
Hispanic	4.1	53.3	9.6	7.0	10.9	44.6	5.7	38.7	14.1	14.5
Black, nonHispanic	5.8	54.2	9.6	6.1	12.4	33.7	5.6	26.6	8.3	16.9
White, nonHispanic	9.4	53.5	8.1	4.5	10.2	37.3	4.8	32.8	10.6	26.8

NOTE: Estimates may sum to greater than 100% because students may have earned Carnegie units in more than one vocational program area.

SOURCE: Hoachlander (forthcoming), pp. 17–18, and unpublished tabulations from the 1987 High School Transcript Study.

109

Table B–3a

Percentage of 1982 public high school seniors completing one or more courses in specific labor market preparation, by vocational programs and by gender and race ethnicity

	Agriculture	Business	Marketing and distribution	Health	Occupational home economics	Trade and industry					Technical and communications
						Total	Construction	Mechanics and repairers	Precision production	Transportation	
Female											
Race ethnicity											
Native American	13.3	78.4	11.2	10.3	20.7	19.7	0.0	6.9	15.1	0.0	6.4
Asian	3.5	54.9	3.9	3.5	6.7	21.9	1.8	2.9	19.6	0.0	8.6
Hispanic	5.2	71.3	8.0	6.8	22.4	15.5	1.3	1.3	13.7	0.5	7.1
Black, nonHispanic	5.6	63.9	12.5	9.0	18.0	15.9	1.6	0.7	14.3	0.6	11.2
White, nonHispanic	5.5	66.4	9.4	5.0	17.5	15.8	0.8	2.1	13.5	0.2	11.4
Male											
Race ethnicity											
Native American	16.0	20.3	5.9	2.8	1.9	81.0	12.3	47.5	73.7	0.0	5.7
Asian	5.0	23.1	2.5	6.2	3.3	63.7	5.5	20.1	51.5	2.8	20.5
Hispanic	16.6	38.2	8.8	3.3	3.3	69.8	14.7	26.5	58.4	0.5	9.2
Black, nonHispanic	9.4	37.9	11.2	4.9	7.4	62.4	15.8	17.6	46.5	0.5	10.8
White, nonHispanic	15.3	39.6	8.4	2.9	4.5	63.7	14.0	25.0	53.5	0.7	17.0

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Sophomore Cohort 1982 High School Transcript Study and survey data.

Table B–3b

Percentage of 1987 public high school seniors completing one or more courses in specific labor market preparation, by vocational programs and by gender and race ethnicity

	Total SLMP	Agriculture	Business	Marketing and distribution	Health	Occupational home economics	Trade and industry					Technical and communications
							Total	Construction	Mechanics and repairers	Precision production	Trans-portation	
Female												
Total	83.9	3.8	62.0	9.6	7.0	15.3	15.0	0.8	1.6	13.6	0.2	20.5
Race ethnicity												
Native American	90.5	3.7	77.2	4.4	13.5	9.7	27.3	3.1	0.7	25.7	1.0	14.8
Asian	78.6	0.5	53.5	10.9	10.9	7.0	15.9	0.0	1.3	14.5	0.3	22.4
Hispanic	80.1	2.3	58.5	11.3	9.2	14.4	19.5	1.0	2.7	16.7	0.0	12.8
Black, nonHispanic	86.0	2.7	61.3	11.0	8.6	17.4	14.5	0.8	0.9	13.4	0.1	13.5
White, nonHispanic	84.2	4.3	62.7	8.5	6.5	14.9	14.4	0.4	1.5	13.2	0.1	22.9
Male												
Total	88.9	12.1	39.6	7.2	3.0	4.8	60.3	9.9	19.9	51.1	0.7	25.8
Race ethnicity												
Native American	91.4	17.7	49.1	3.2	1.7	4.8	73.6	19.8	19.6	63.2	0.2	24.3
Asian	81.8	0.8	34.4	3.5	6.0	1.1	47.4	2.1	19.4	37.1	0.6	33.9
Hispanic	87.3	5.7	35.8	6.6	4.5	4.5	68.8	9.8	24.4	59.2	0.5	12.8
Black, nonHispanic	84.7	9.4	36.9	6.8	2.0	5.5	51.7	10.5	15.0	37.9	0.6	17.2
White, nonHispanic	90.0	14.3	40.0	7.3	3.1	5.0	60.7	9.4	19.6	52.6	0.5	28.5

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 High School Transcript Study.

Table B–4
Percentage of 1980 high school seniors enrolled in public two-year institutions by 1984 earning greater than zero credits in vocational education, by race ethnicity and by detailed vocational program

Vocational Program Areas	Total	Native American	Asian	Hispanic	Black, non Hispanic	White, non Hispanic
Agriculture						
Total	3.2	—	5.5	3.0	0.4	3.3
Horticulture	0.4	—	—	0.3	—	0.4
Agricultural science	1.5	—	—	2.5	—	1.7
Renewable resources	1.1	—	4.6	0.7	—	1.0
Other	1.1	—	—	1.0	—	1.2
Business and office						
Total	41.2	36.3	34.3	42.1	39.7	41.7
Accounting	19.1	10.3	21.4	13.5	16.2	20.0
Business and management	24.4	20.4	19.0	27.3	21.7	24.7
Secretarial	6.3	9.8	4.0	7.5	6.9	6.2
Other	17.6	22.0	14.4	20.4	19.4	17.2
Marketing and distribution	6.8	2.9	6.9	7.8	6.2	6.9
Health						
Total	10.3	7.5	10.9	14.4	8.1	10.3
Nursing	1.8	—	1.0	0.8	1.1	2.0
Health science	5.2	3.5	5.5	8.1	3.7	5.1
Allied health	5.6	—	4.7	6.5	4.0	5.9
Home economics						
Total	16.5	15.8	23.0	17.2	11.2	17.0
Home economics	9.7	—	18.9	9.4	6.2	10.0
Occupational	9.7	12.0	12.2	9.7	6.1	10.1
Technical education						
Total	30.4	30.7	37.9	28.3	24.1	31.2
Computers/data processing	19.7	9.4	25.6	17.6	15.5	20.2
Computer programming	8.6	8.6	9.3	7.9	4.5	9.2
Data processing	9.5	5.0	14.2	7.6	9.7	9.5
Other computer	8.0	2.7	8.3	5.2	5.2	8.6
Engineering/science	9.7	15.1	8.9	8.8	6.3	10.3
Engineering	9.5	14.8	8.9	8.7	6.3	10.0
Science technology	0.3	—	—	—	—	0.4
Protective service	4.8	9.5	6.4	4.4	2.8	5.1
Communication technology	0.6	—	—	0.4	0.5	0.7
Trade and industry						
Total	11.5	10.4	14.6	13.4	6.3	11.7
Construction	0.3	—	—	0.7	—	0.3
Auto mechanics	2.2	4.3	5.9	3.3	1.4	2.0
Other mechanics	1.3	—	—	1.6	0.6	1.4
Drafting	3.7	6.0	2.8	4.0	2.3	3.8
Precision metal	2.6	—	3.2	2.3	1.7	2.7
Other precision production	4.2	—	4.4	3.3	1.9	4.7

—Sample size too small for reliable estimate.

Source: U.S. Department of Education, National Center for Education Statisitics, High School and Beyond Senior Cohort Postsecondary Education Transcript Study and Base Year through Second Follow-up surveys.